

FIGURE 1A

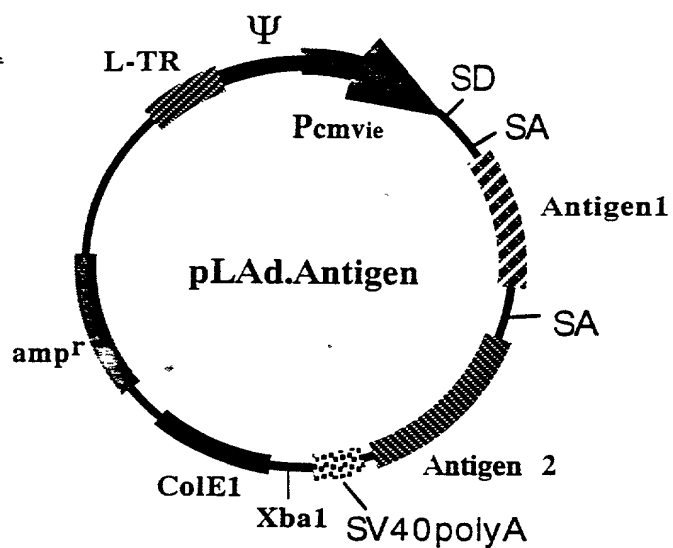


FIGURE 1B

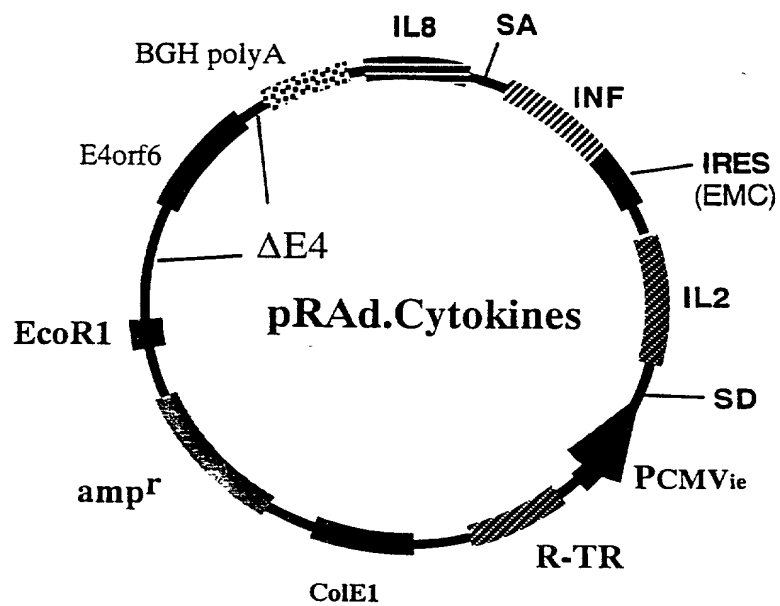


FIGURE 1C

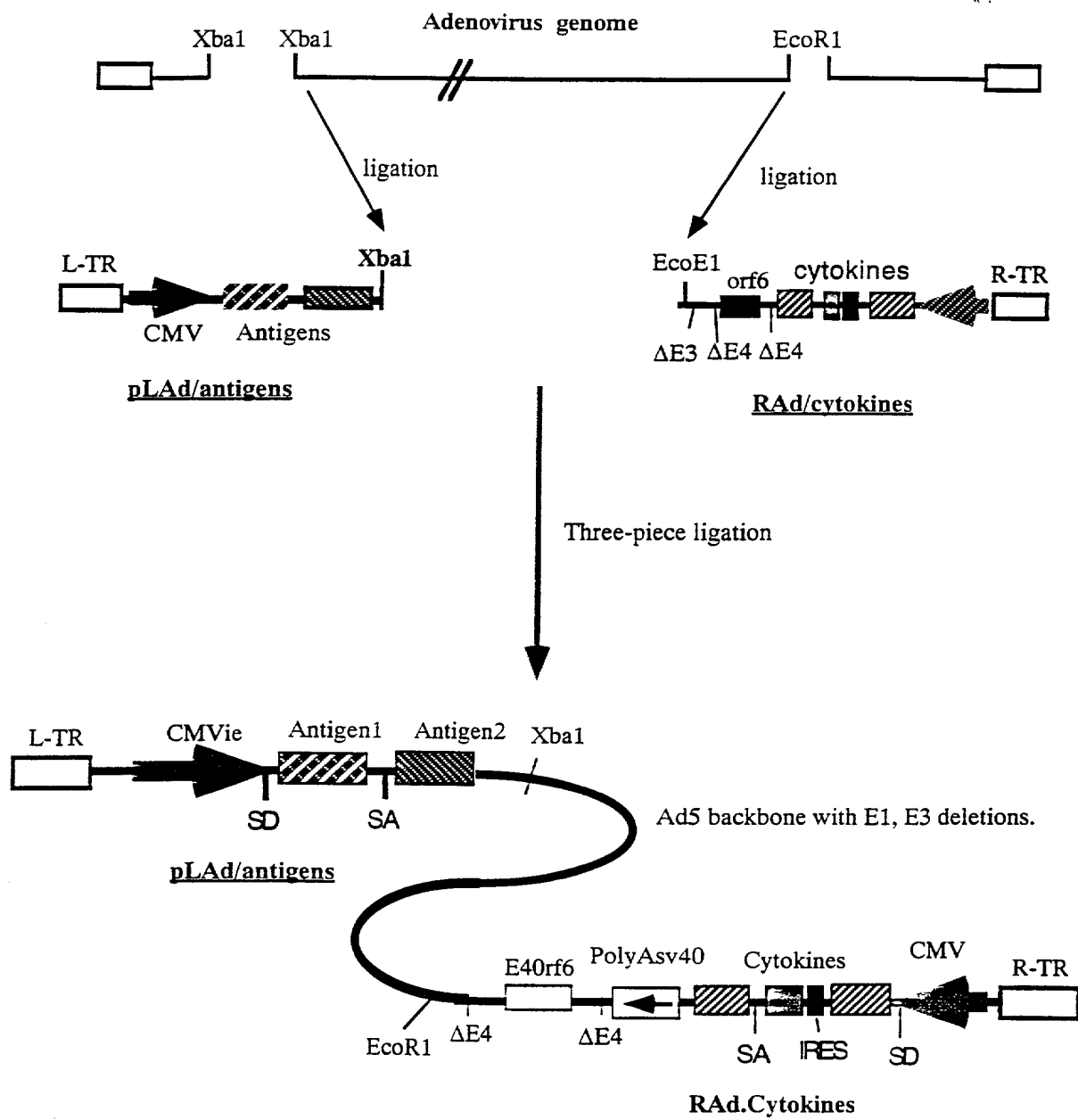
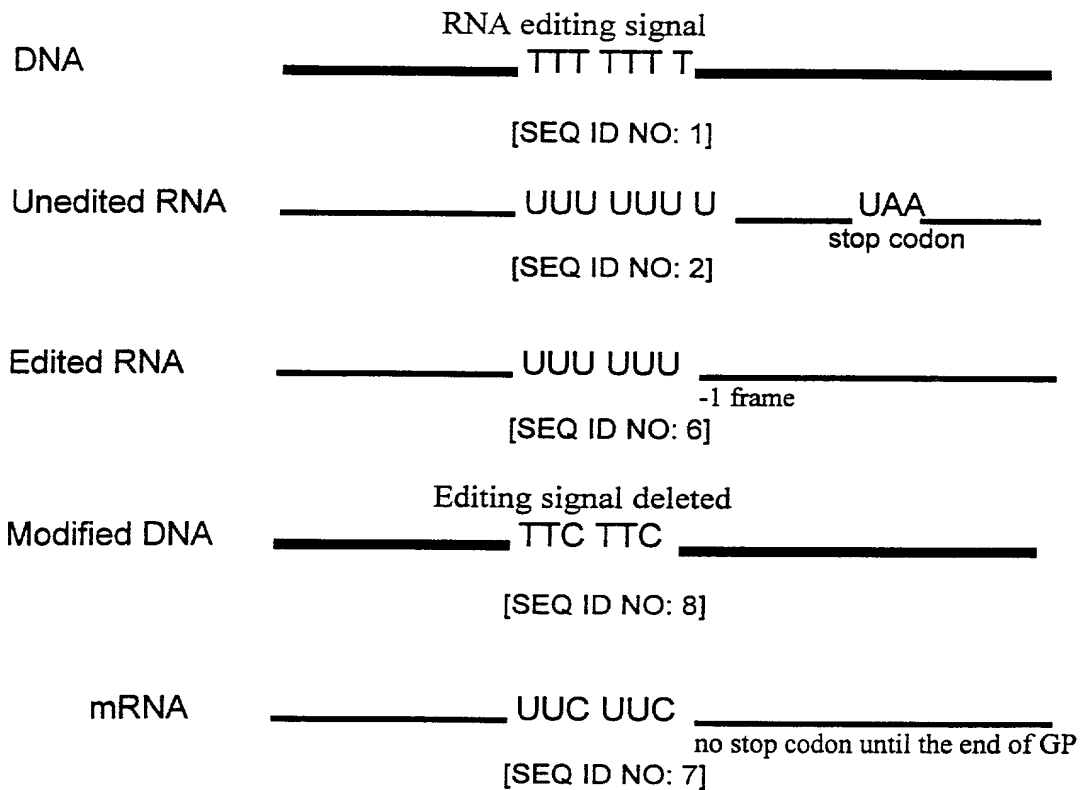


FIGURE 2



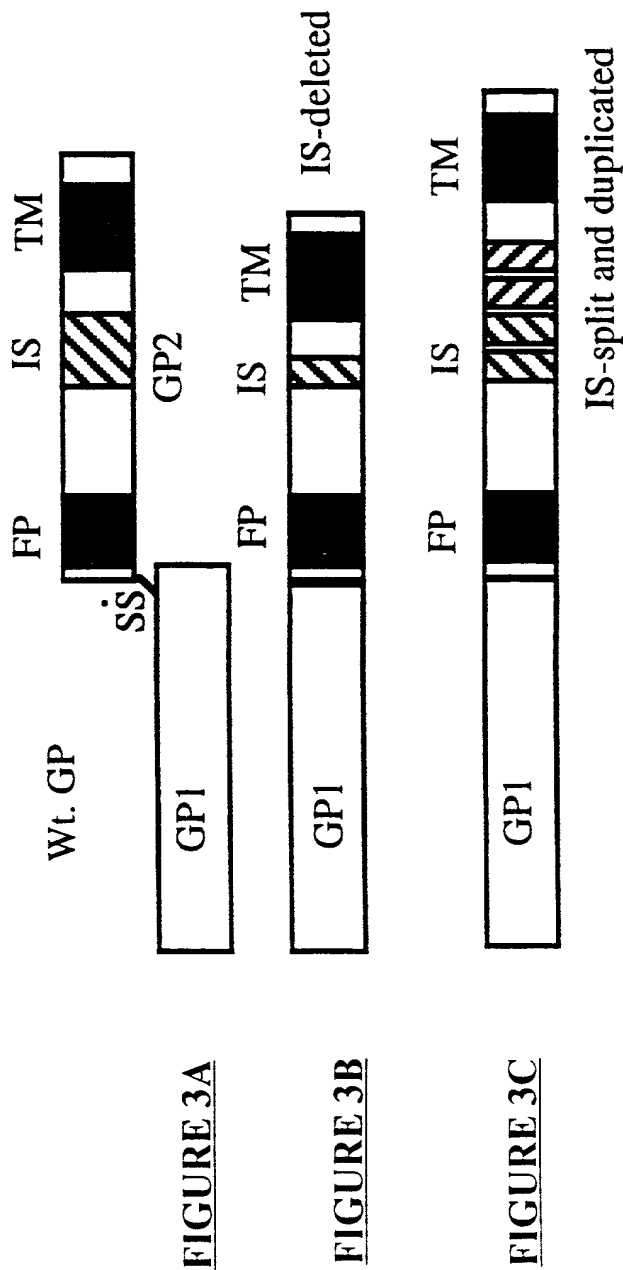


FIGURE 4A

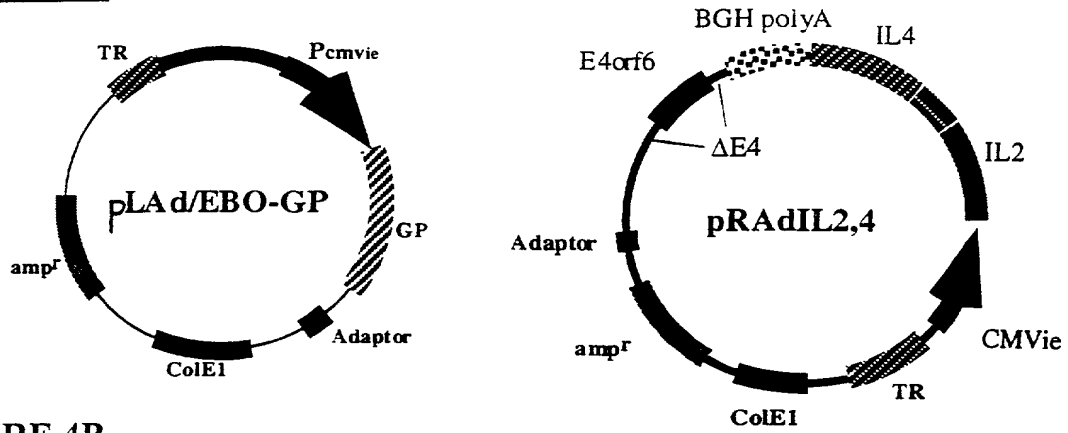


FIGURE 4B

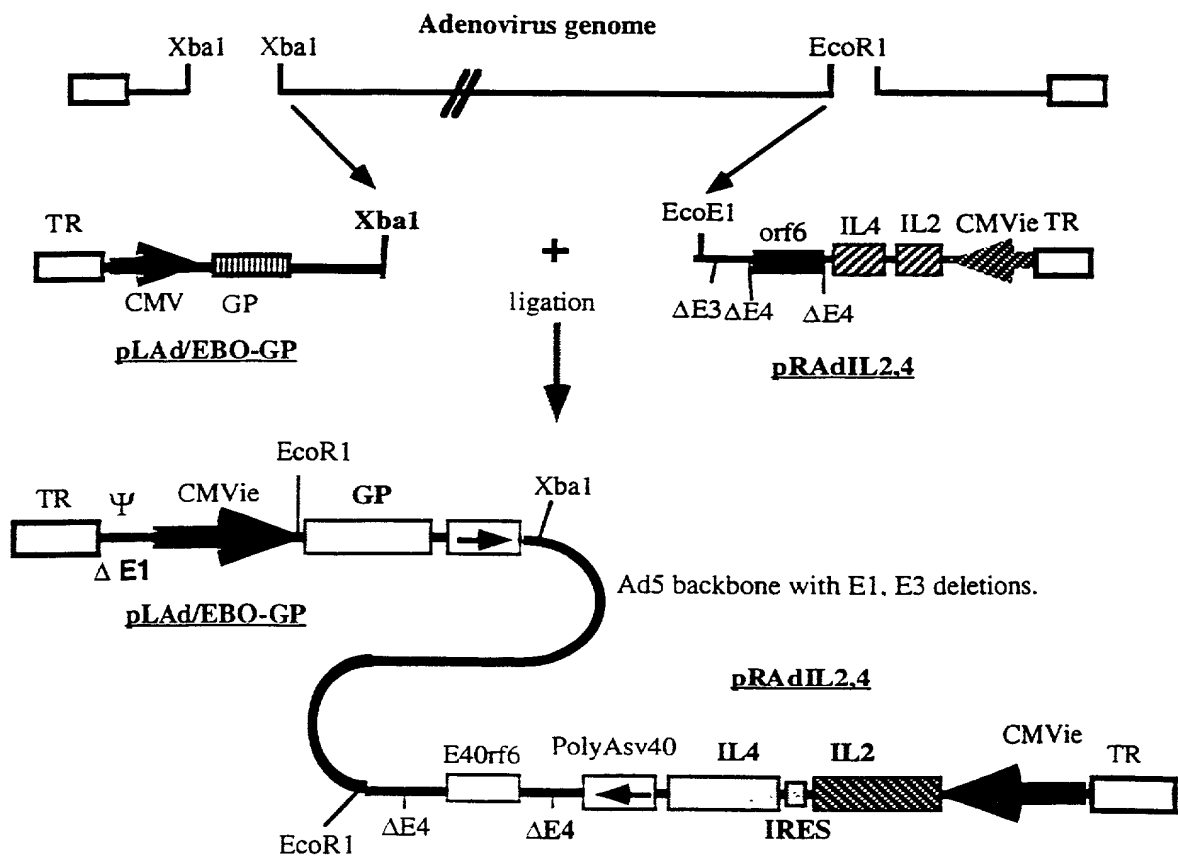
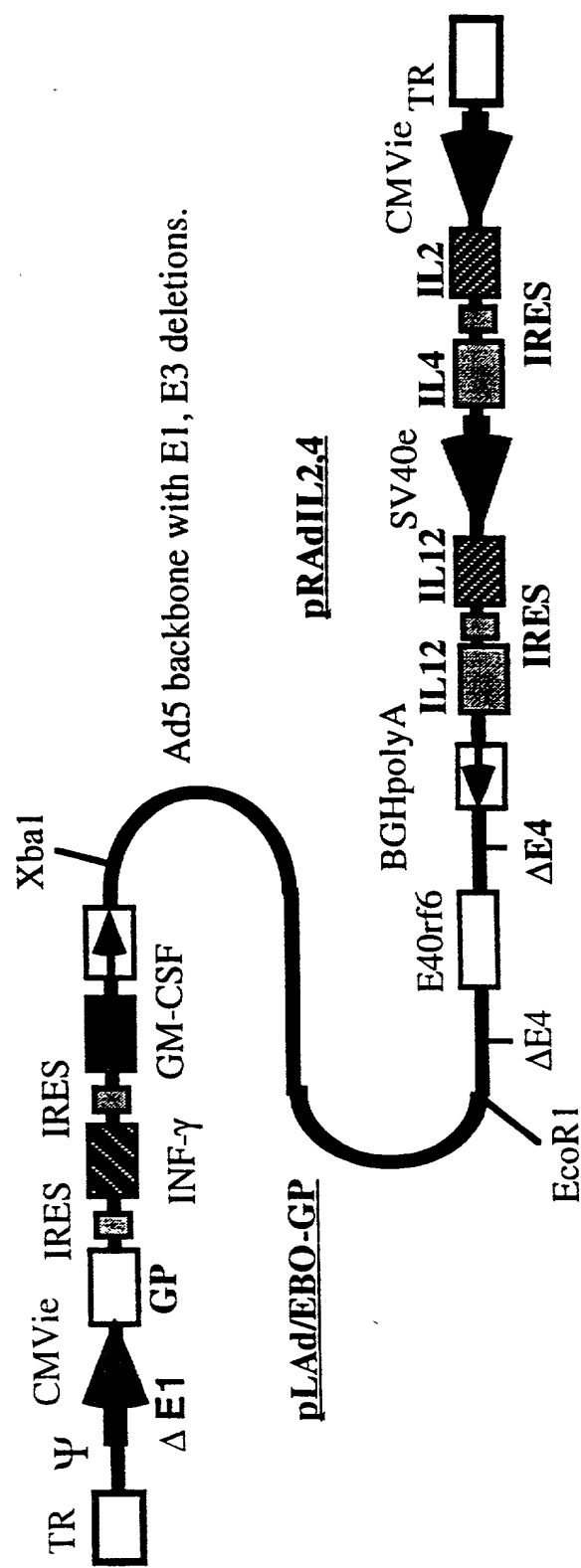


FIGURE 5



Anti-HIV (tat,env) relative titer
(Group 3)

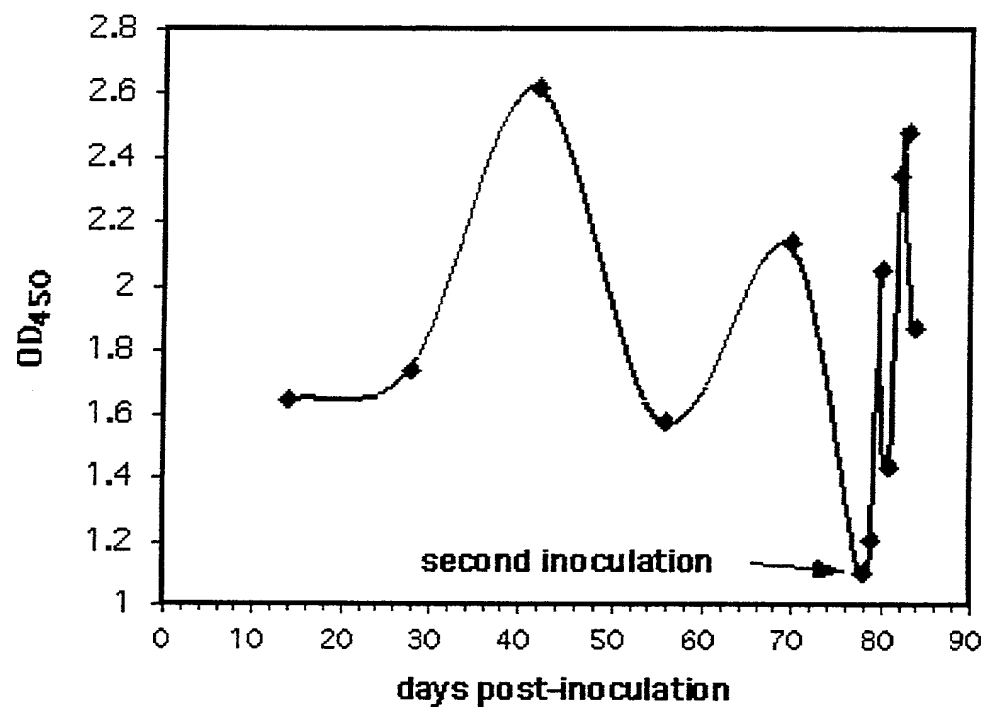


FIGURE 6

Anti-HIV (tat,env) relative titer
(Group 4)

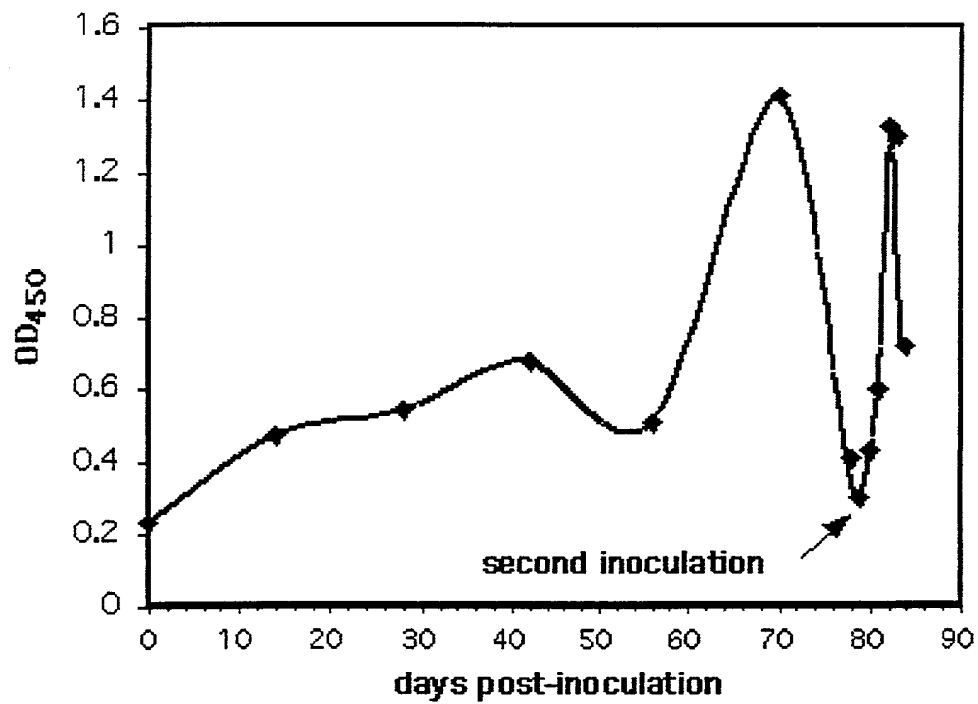


FIGURE 7

IFN γ secretion from activated splenocytes in response to target cell stimulation

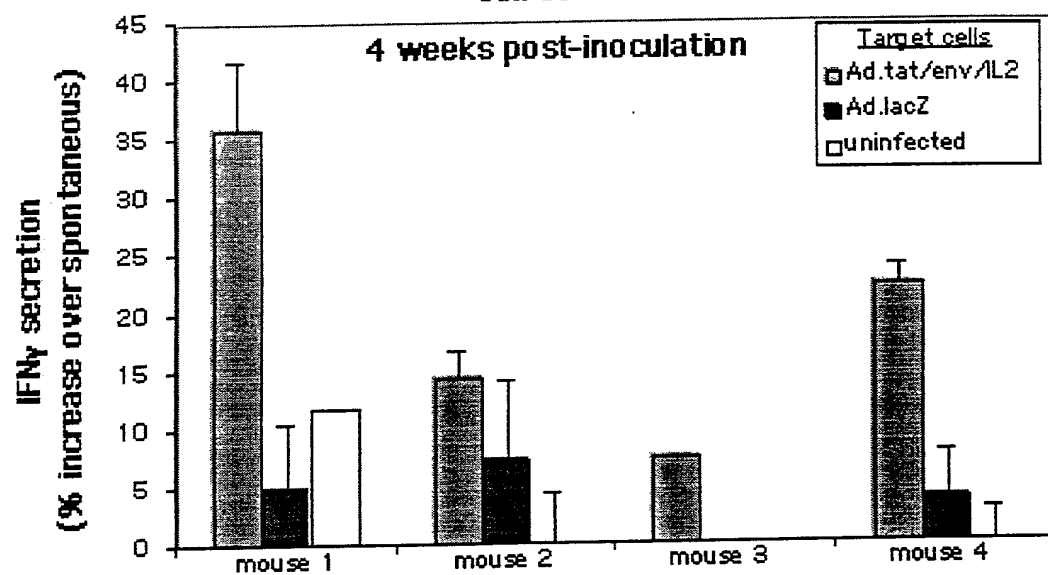


FIGURE 8A

IFN γ secretion from activated splenocytes in response to target cell stimulation

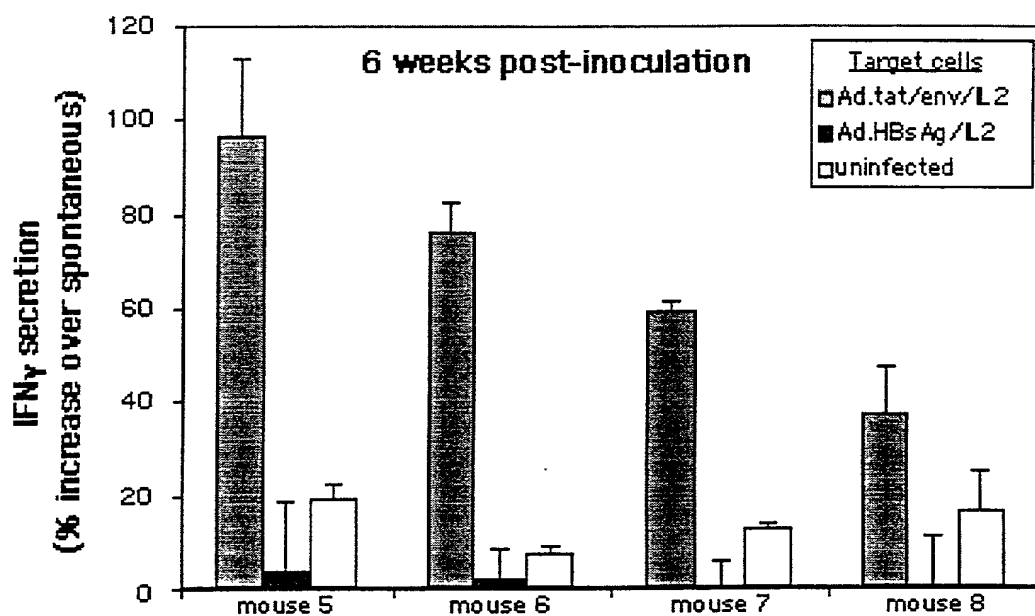


FIGURE 8B

IFN γ secretion from activated splenocytes in response to target cell stimulation

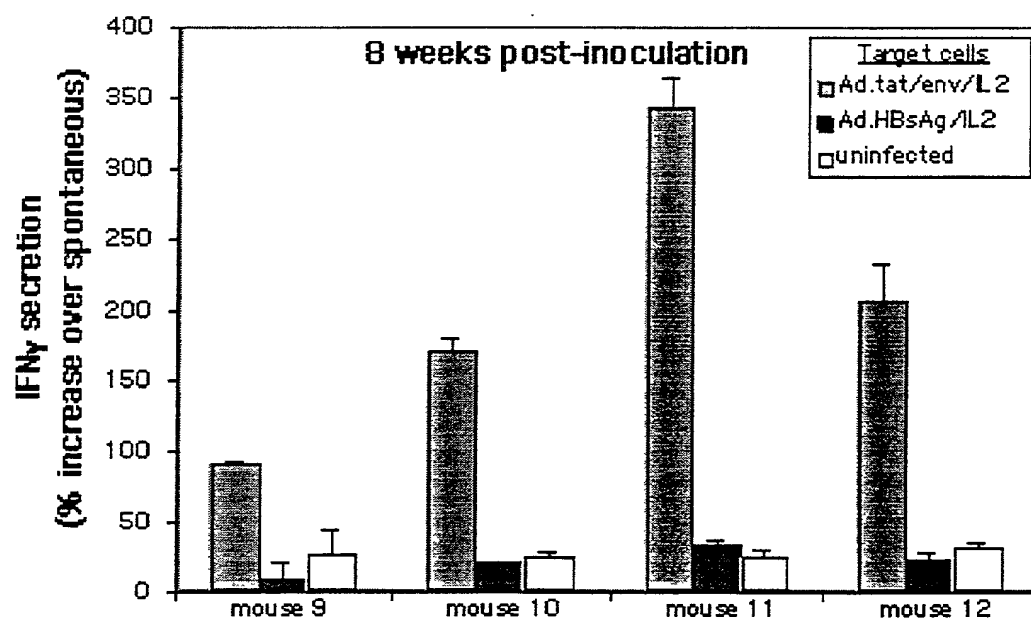


FIGURE 8C

Granzyme A secretion from activated splenocytes in response to stimulation with target cells

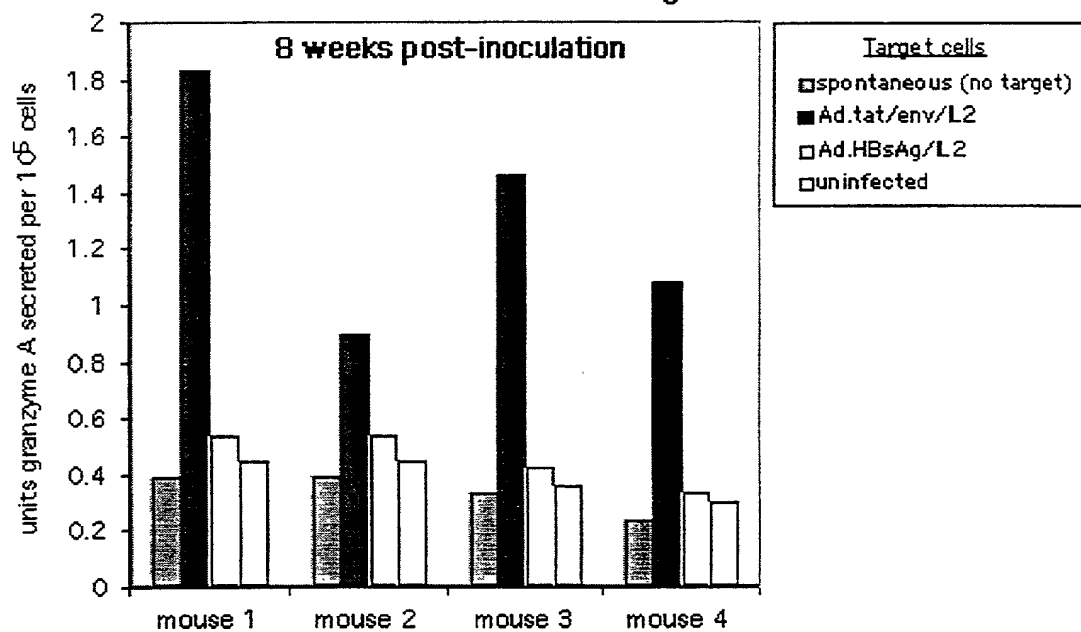


FIGURE 9

Anti-HBsAg relative titer
(Group 1)

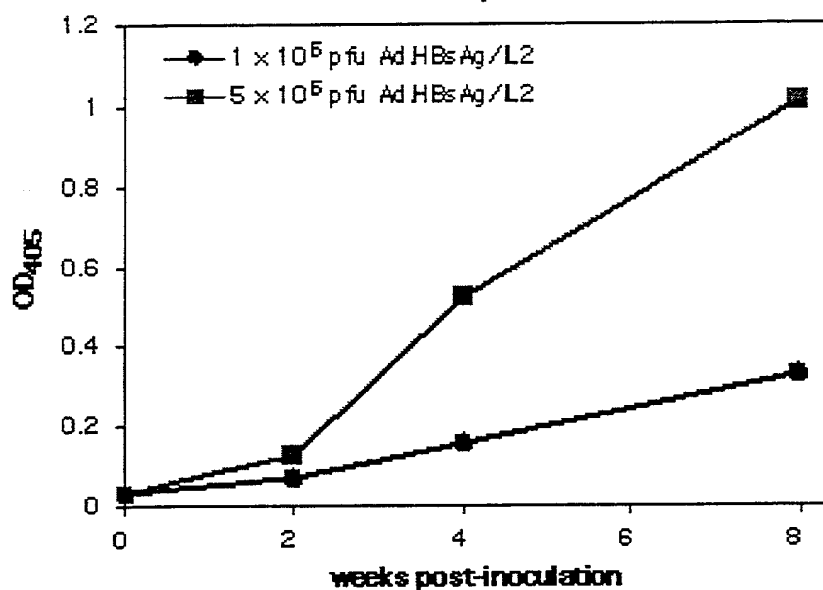


FIGURE 10A

Anti-HBsAg relative titer
(Group 2)

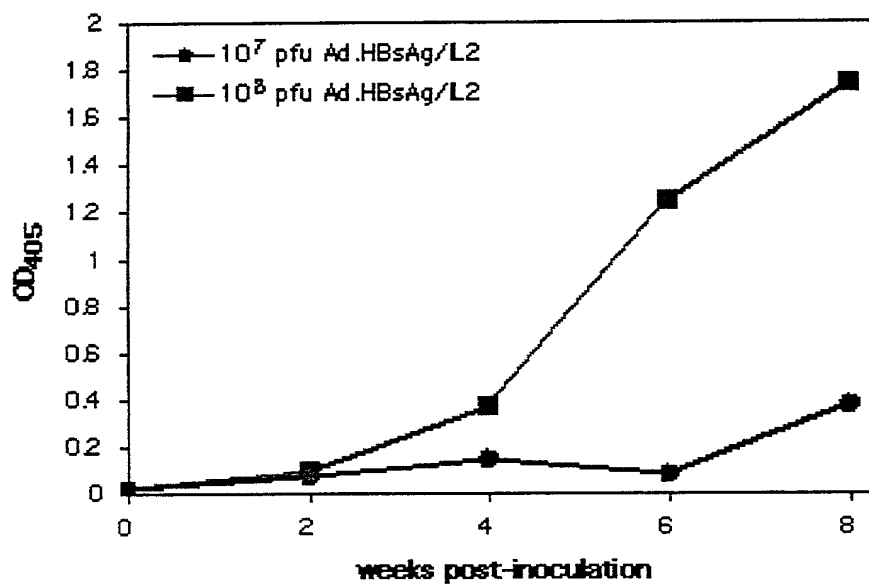


FIGURE 10B

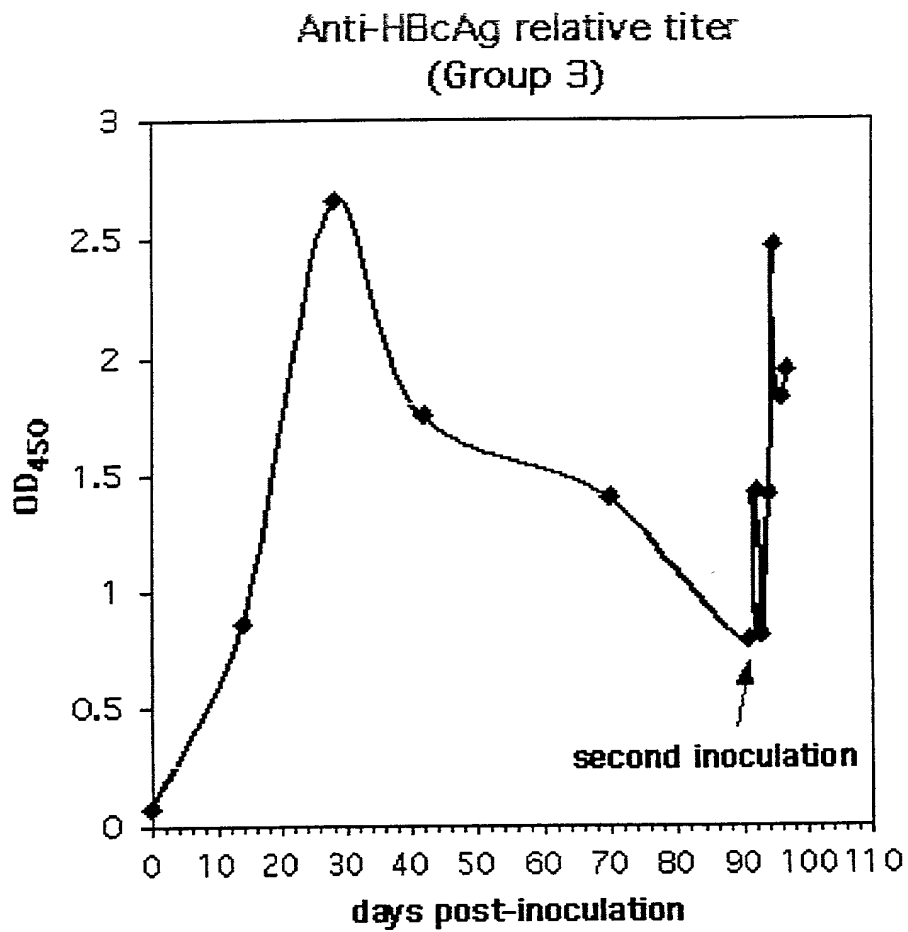


FIGURE 11A

Anti-HBcAg relative titer
(Group 4)

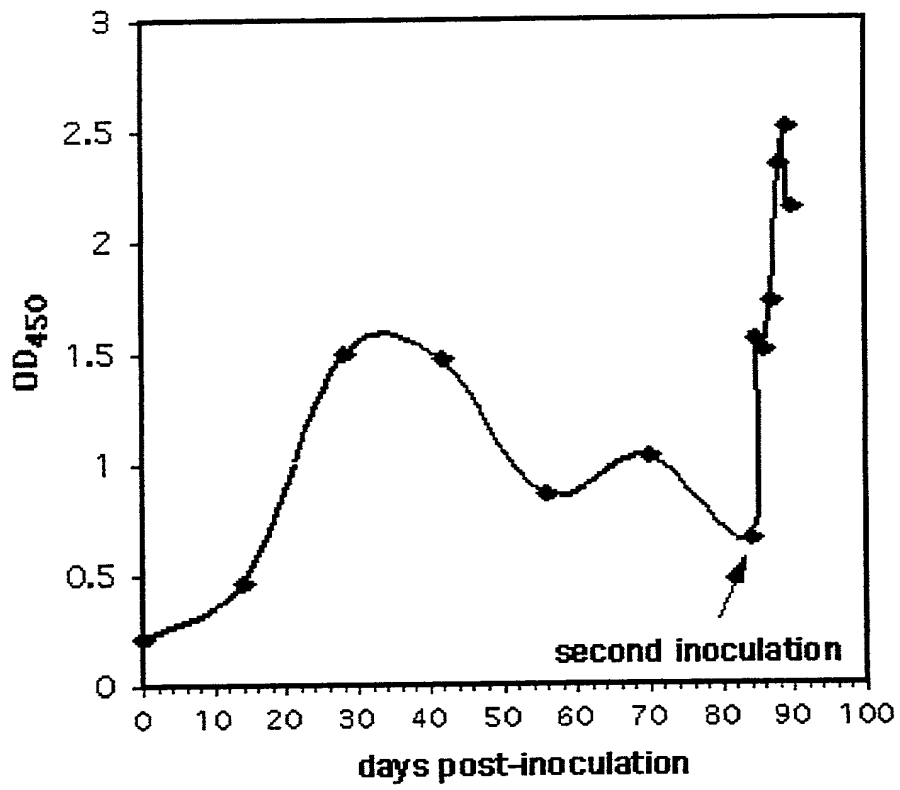
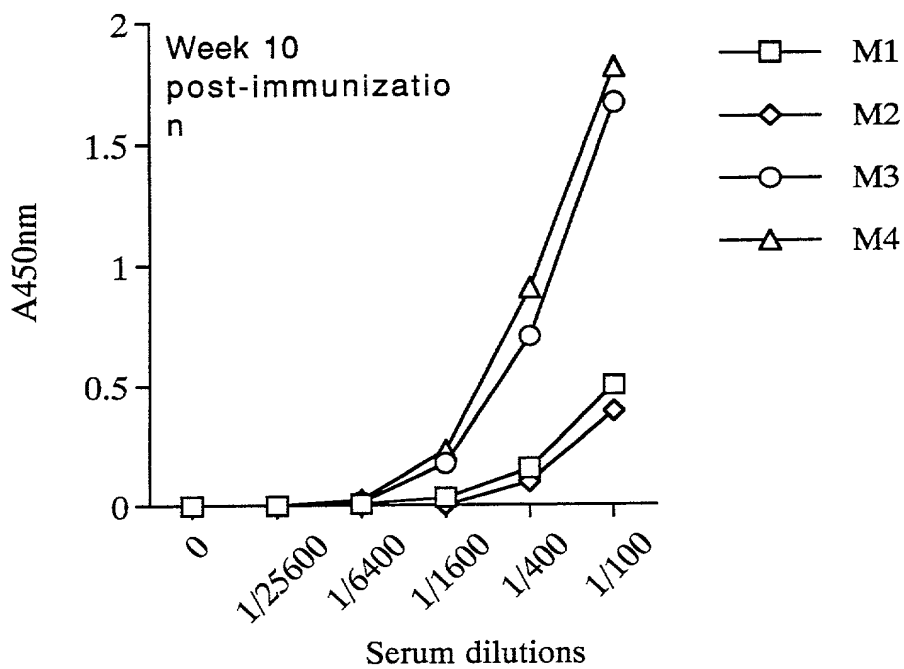


FIGURE 11B

FIGURE 12

A.



B.

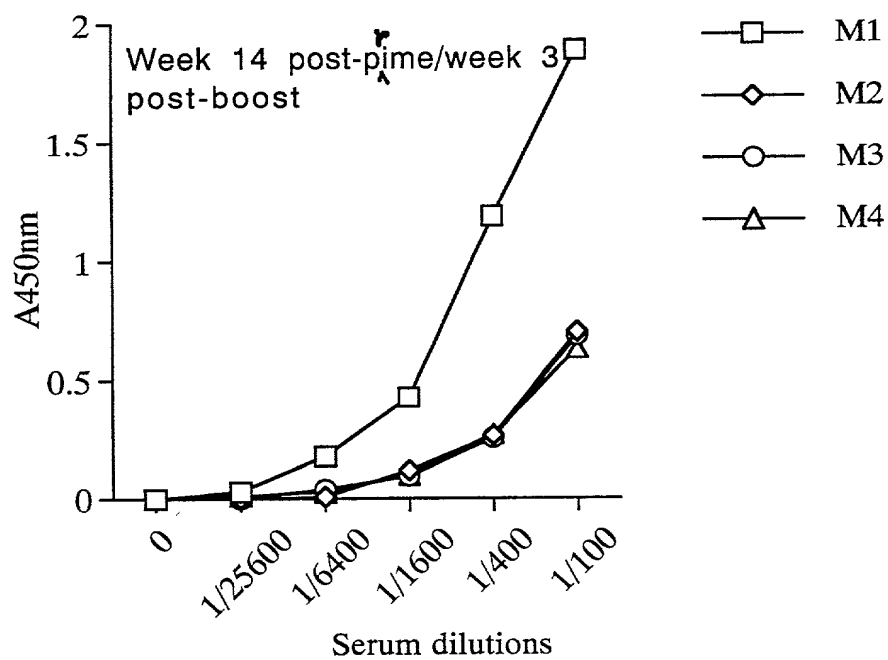


FIGURE 13

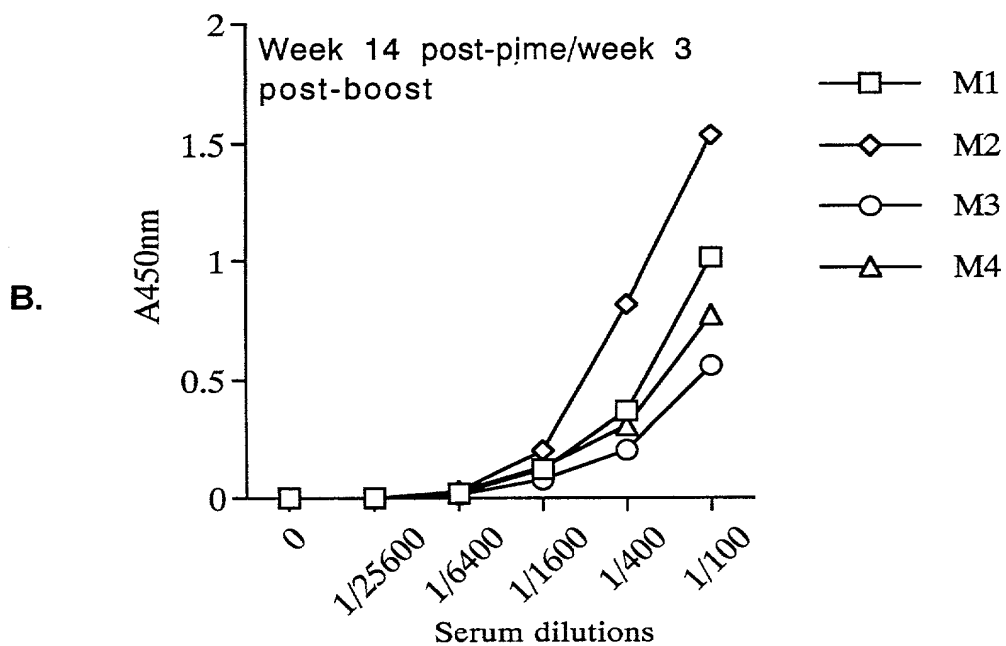
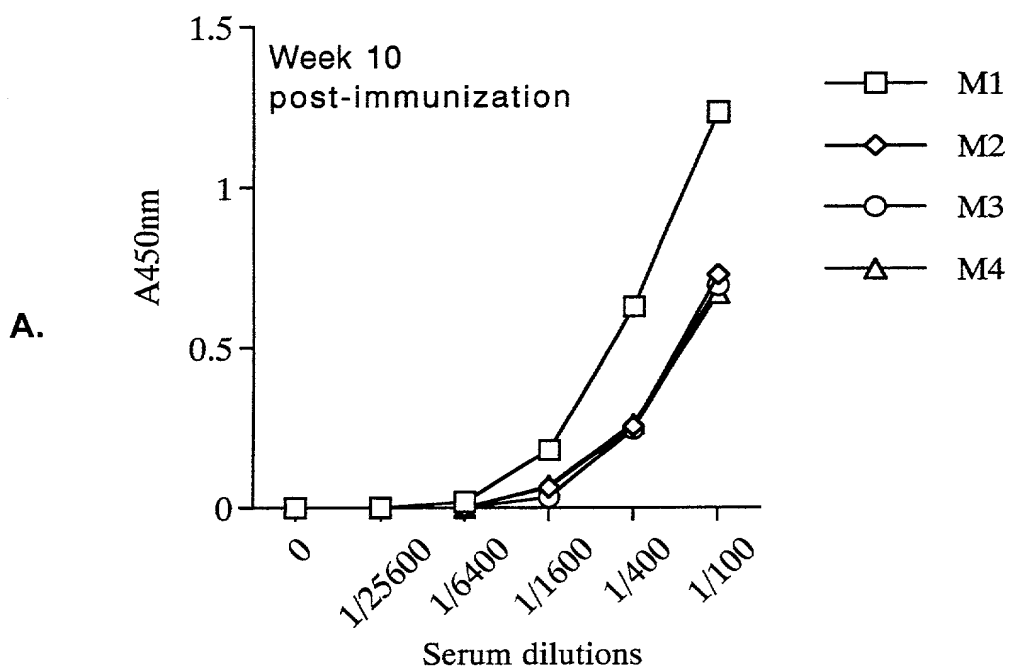
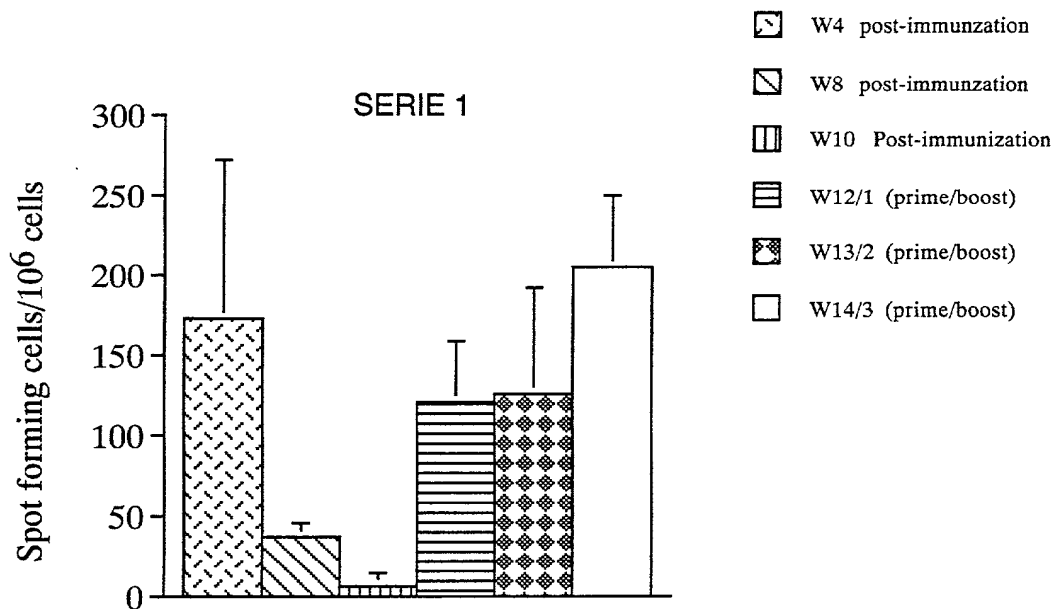


FIGURE 14

Gag-specific IFN γ secreting splenic cells
after immunization of mice with Ad(3C,
Gag, Env)

A.



B.

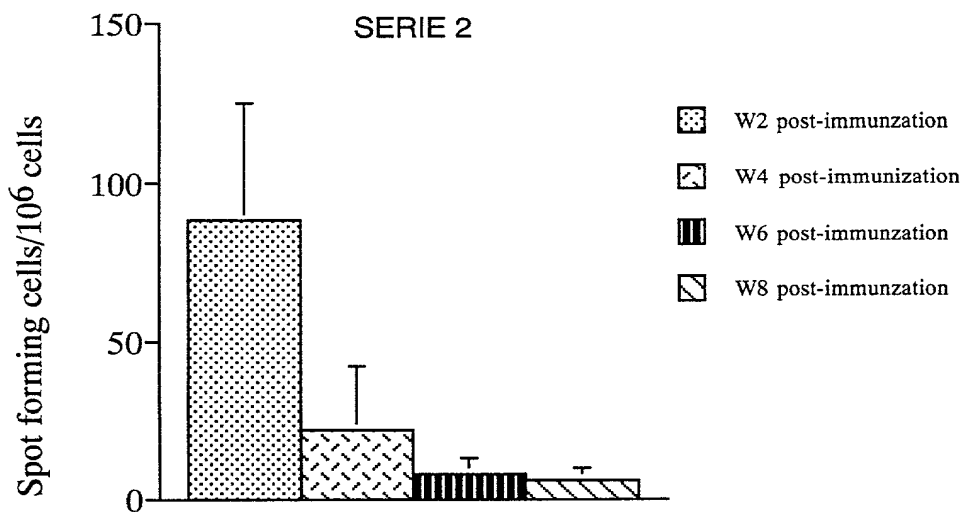


FIGURE 15

L23: ELISPOT for IFN γ secretion: Serie1 spleen cells from mice at week W13/2 (post-prime/boost)

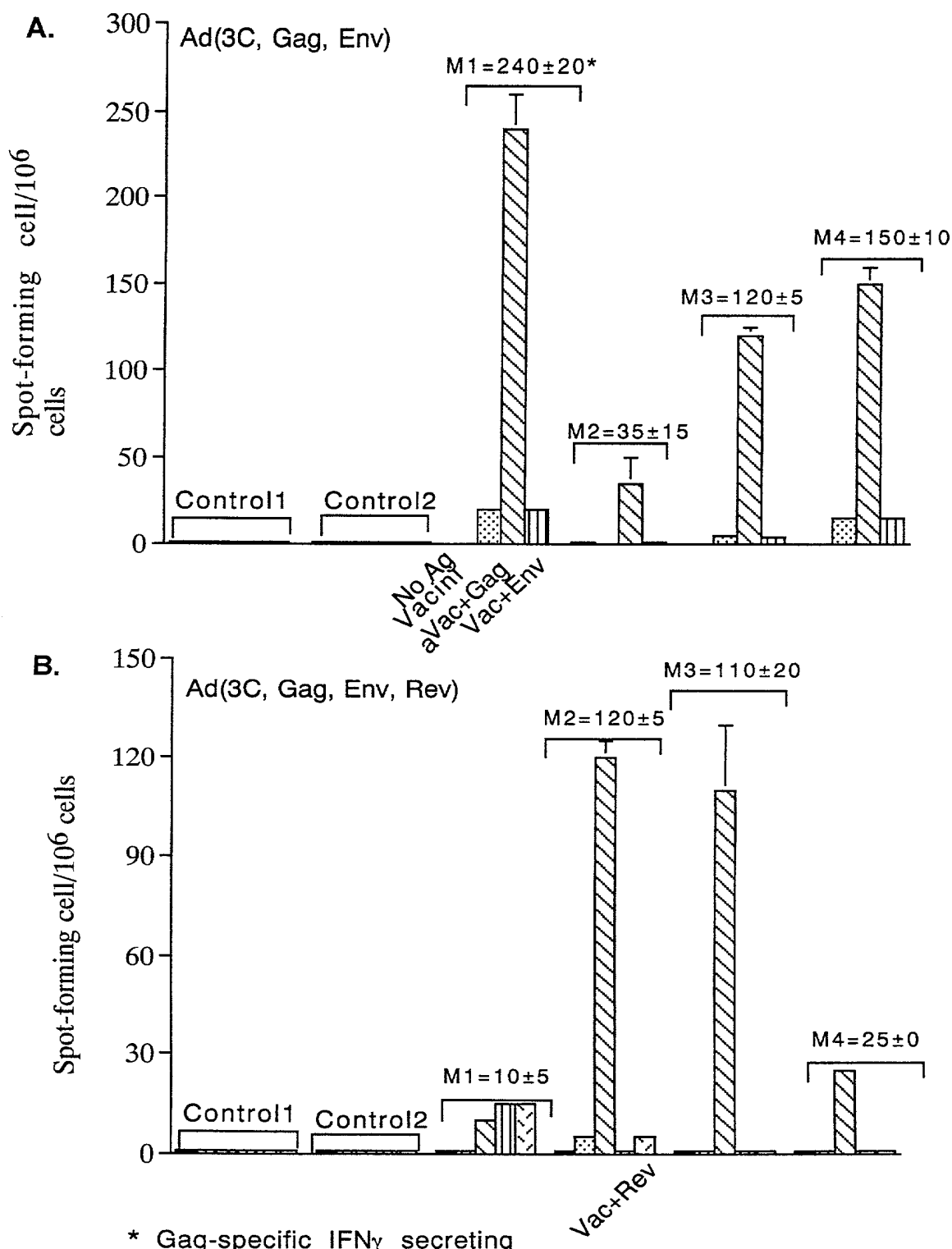
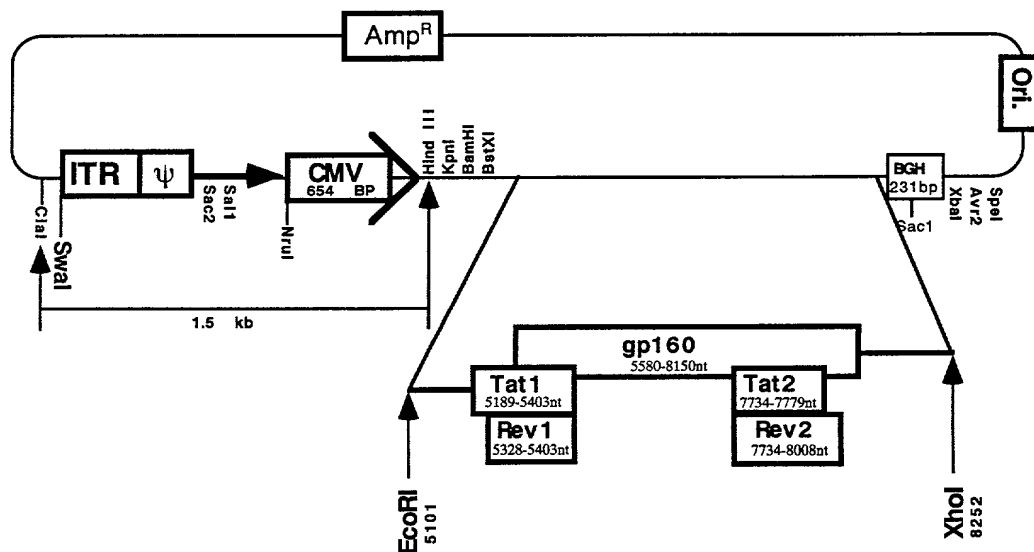
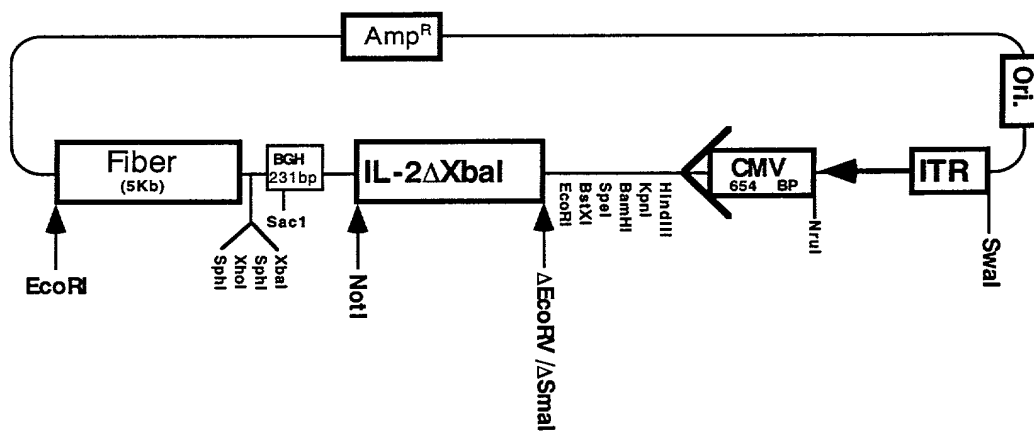


FIGURE 16 Ad-E.T.R/IL2 (from BH10 strain)

A. pLAd-E.T.R

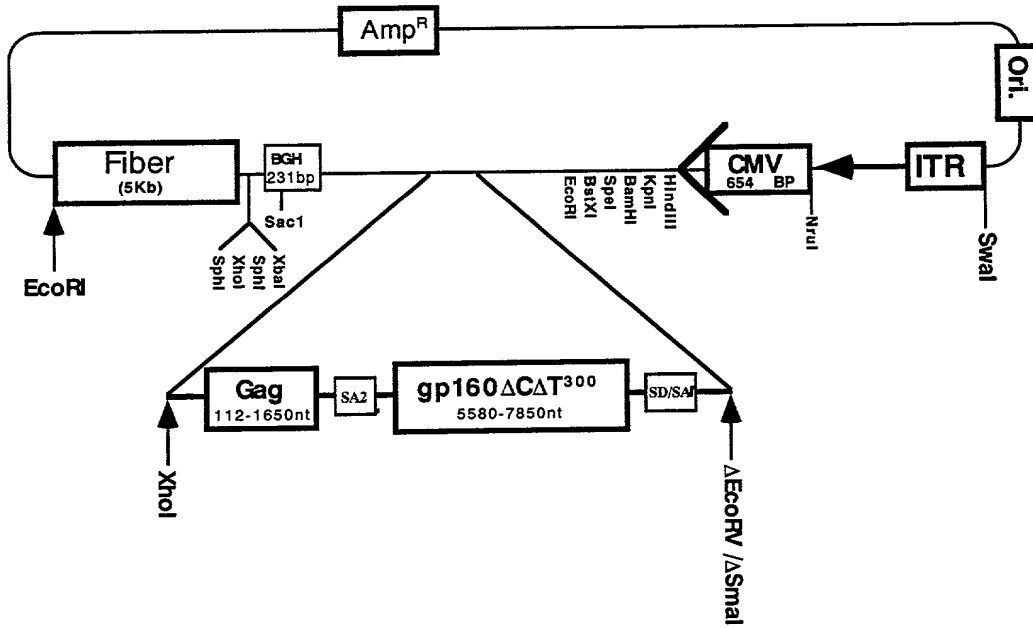


B. pRAd.ORF6-IL2



[illegible]

A. pRAAd.ORF6-E^mΔCΔT³⁰⁰-G



B. pLAd-3C

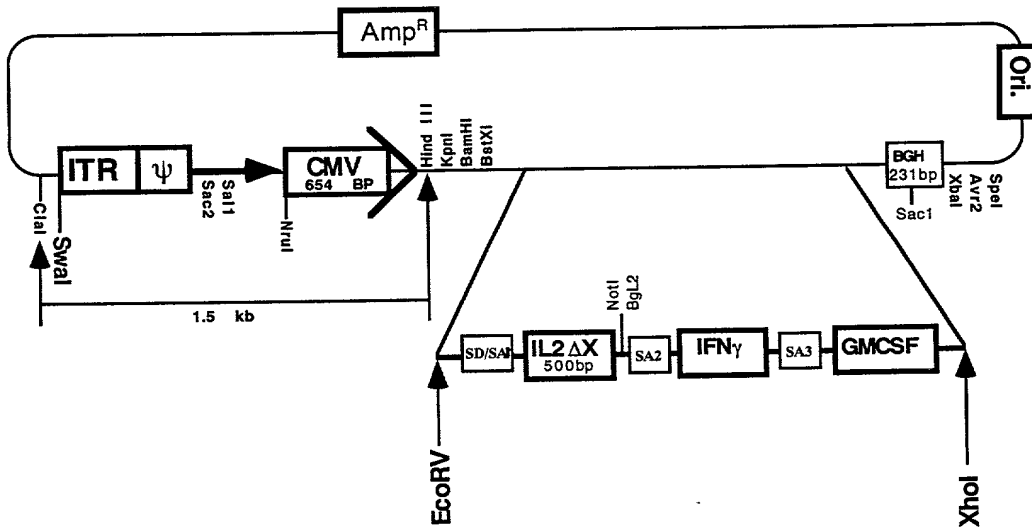


FIGURE 18

pRAAd.ORF6-E^ΔΔCAT⁹⁹.T.R-G

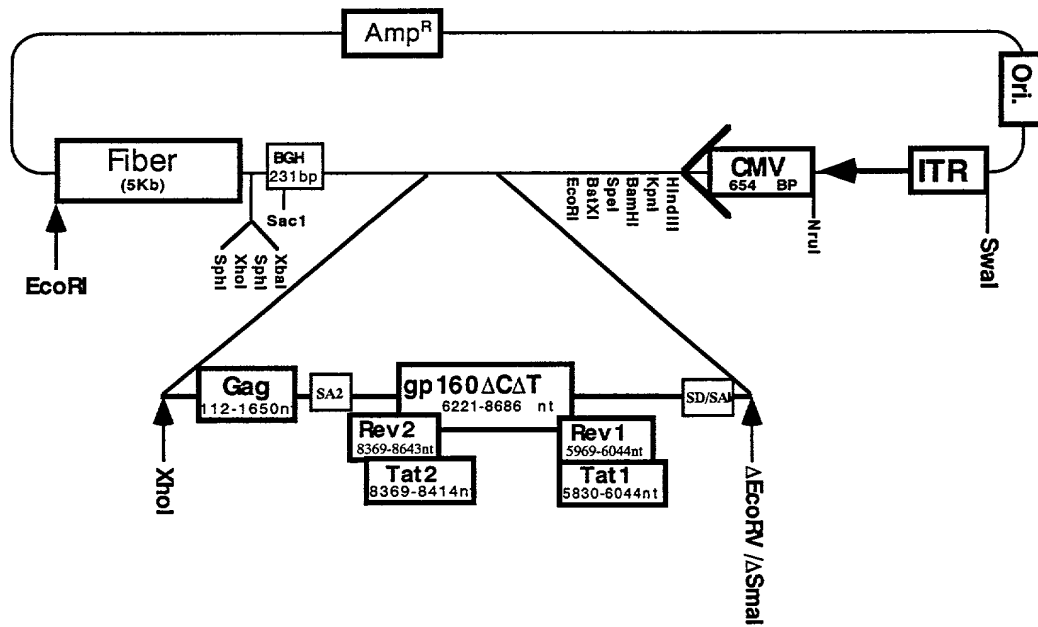
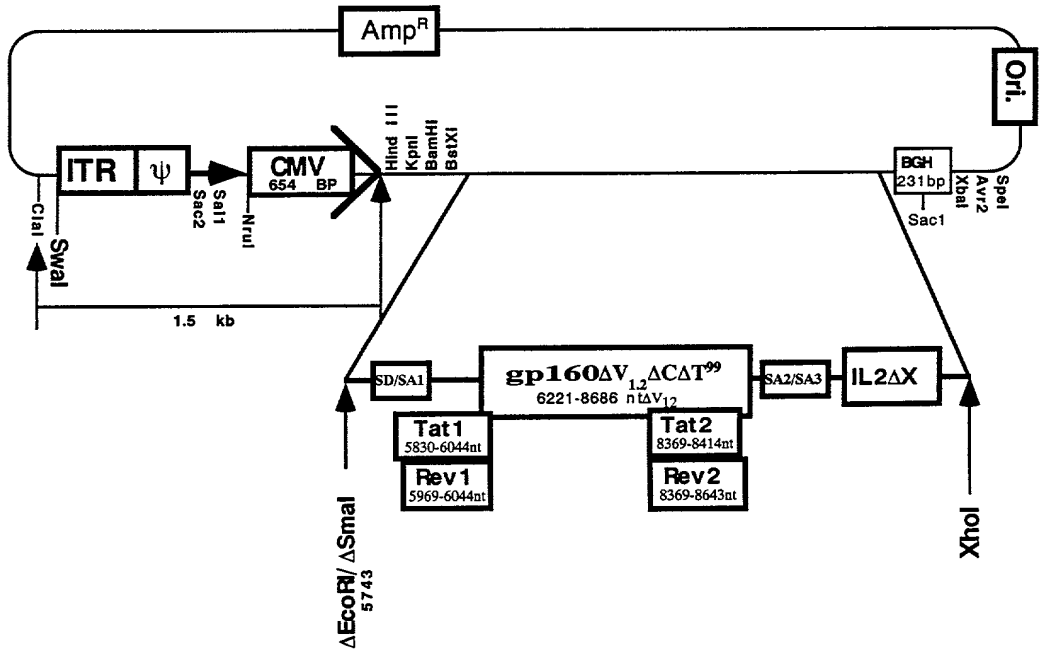


FIGURE 19

A. pLAd-E^m $\Delta V_{1,2}$ Δ CAT.T.R-IL2



B. pRAd. ORF6-G. IL2

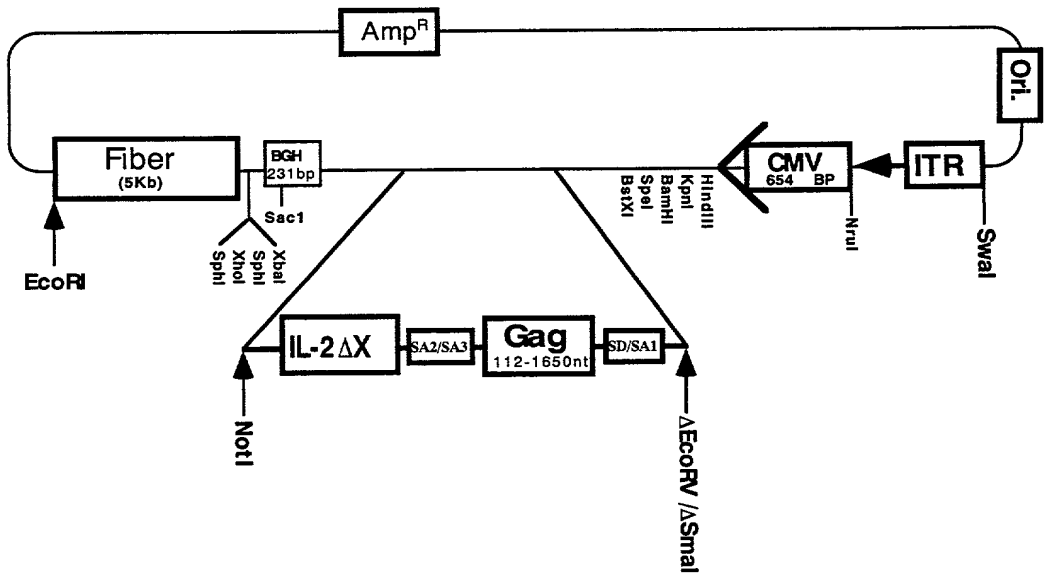


FIGURE 20

pLAd-ETRN

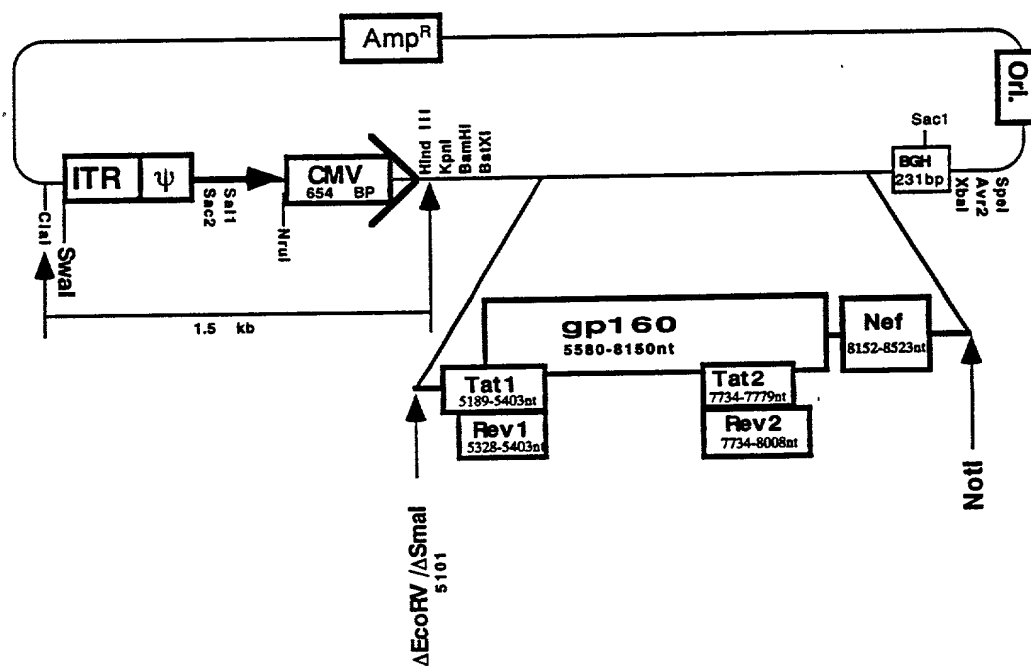


FIGURE 21

pLAd-E^mΔC.N

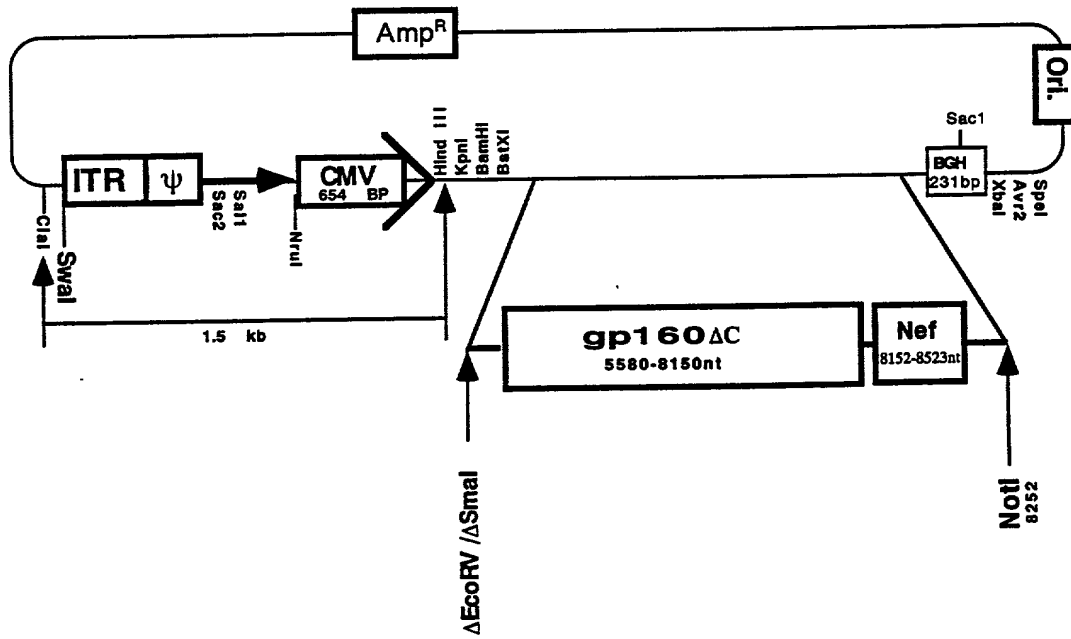


FIGURE 22

pLAd-E^{wt}ΔCAT³⁰⁰.T

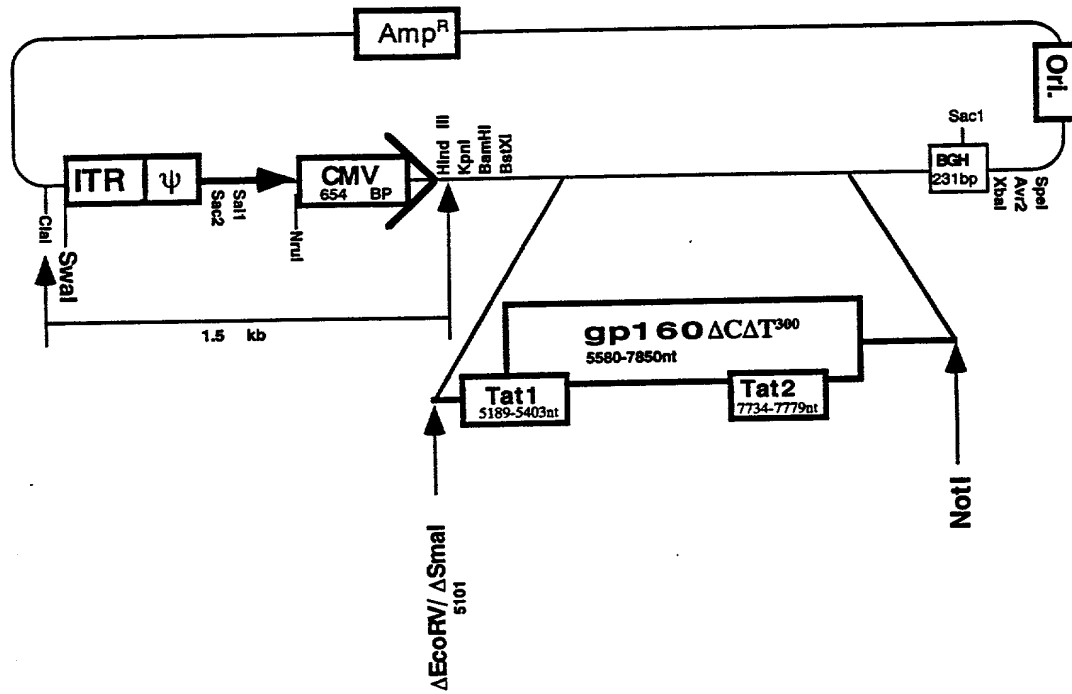
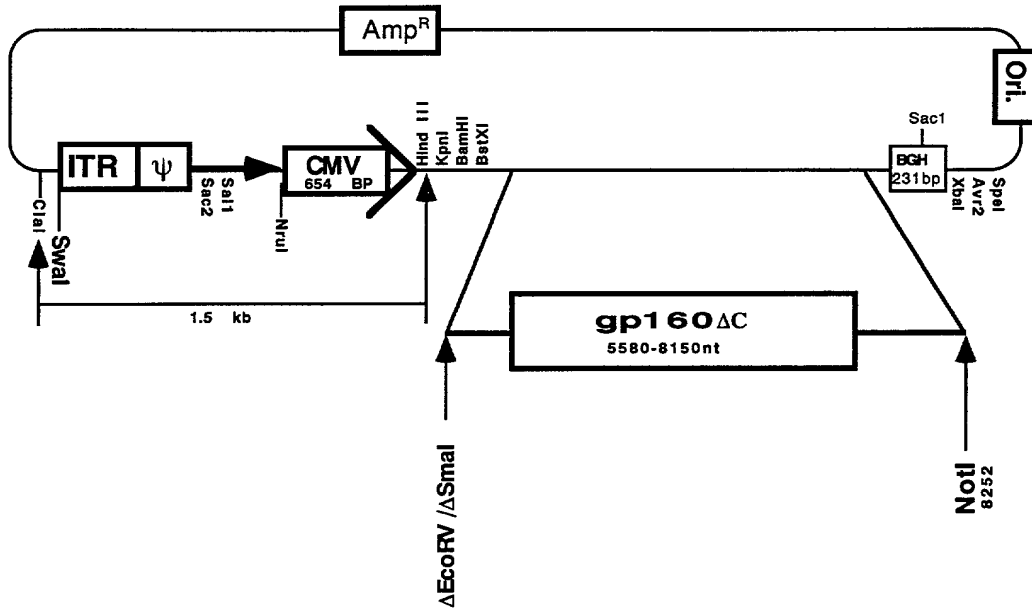
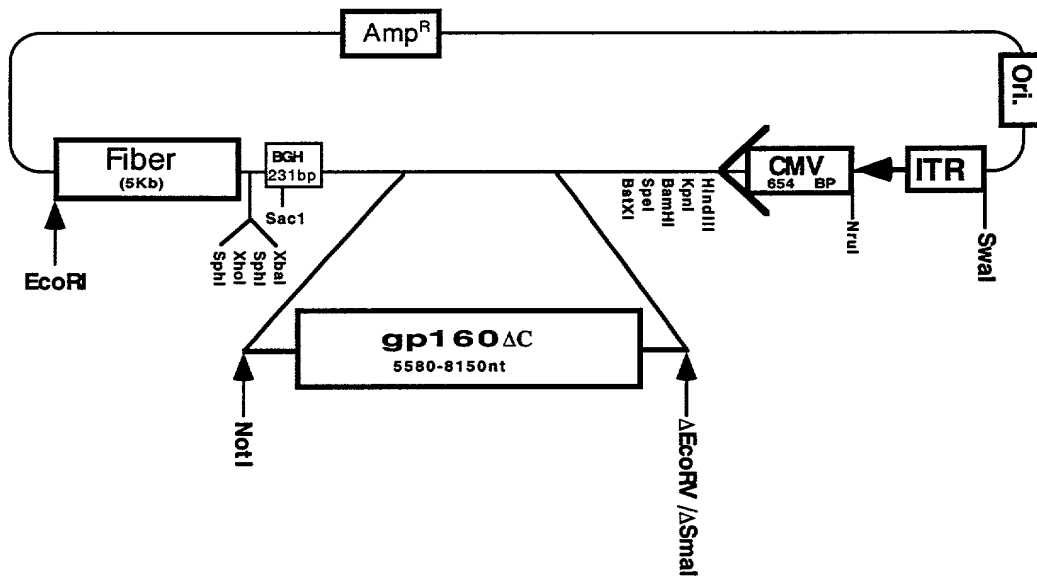


FIGURE 23

A. pLAd-E^mΔC

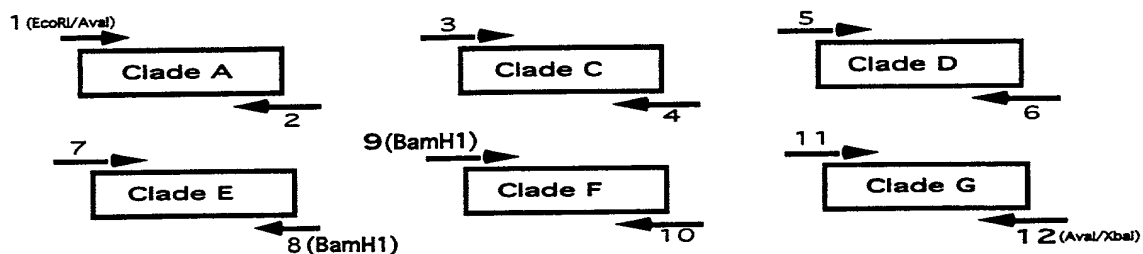


B. pRAd. ORF6-E^mΔC

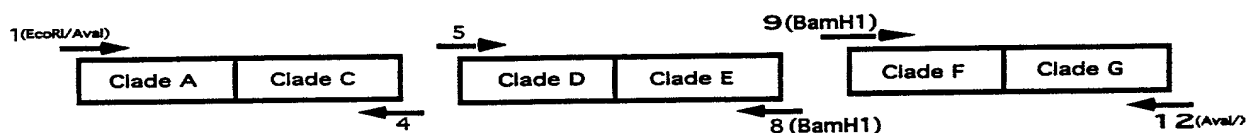


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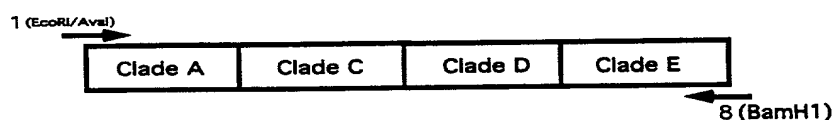
Step 1. Amplification of each individual clade A-G



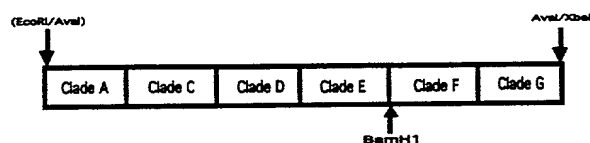
Step 2. Amplification of every two Clades AC, DE, FG



Step 3. Amplification of Clades ACDE



Step 4. Cloning the multi-clades into pSP73 vector



Step 5. Generating of a duplicated multi-clades

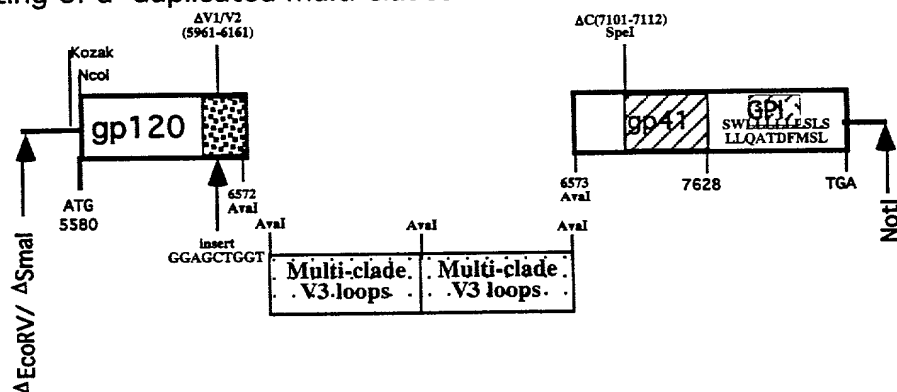
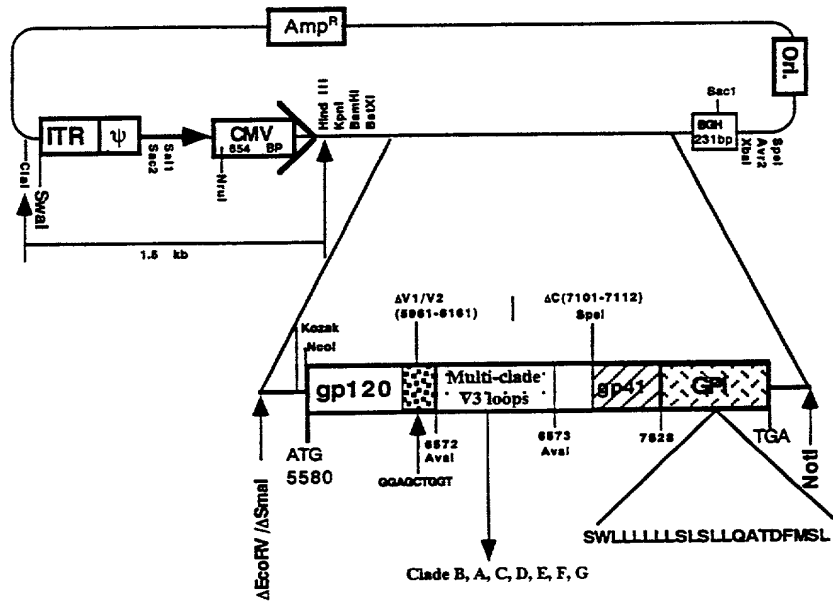
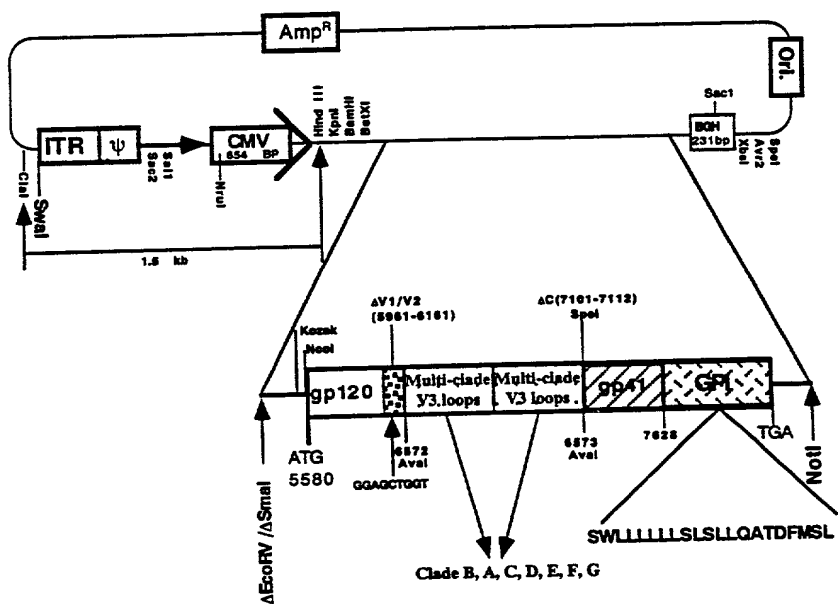


FIGURE 25

pLAd-E^m.V3



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[illegible]

C. pRAAd.ORF6-p17/ 24 MB

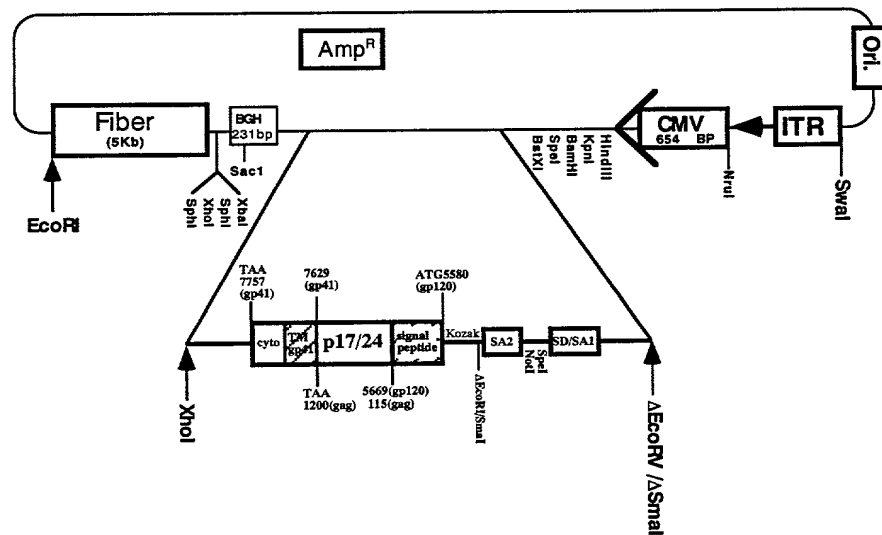
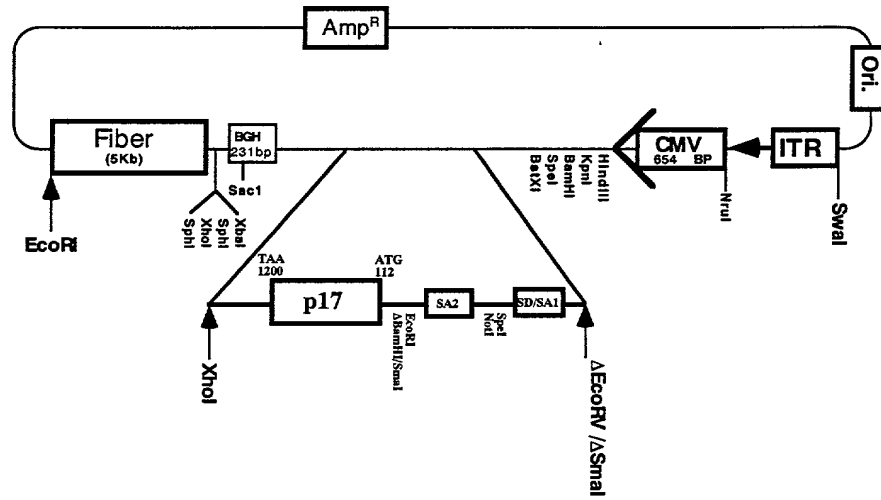
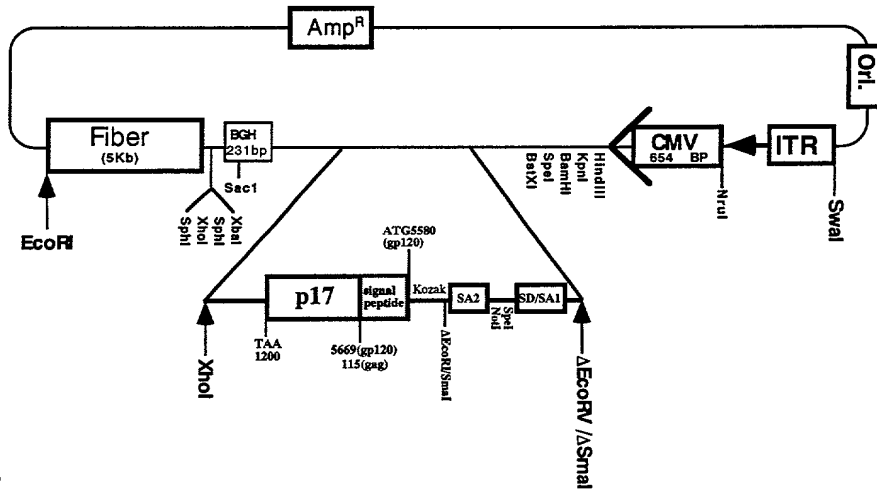


FIGURE 28

A. pRA_d.ORF6-p17



B. pRA_d.ORF6-p17 sec



C. pRA_d.ORF6-p17MB

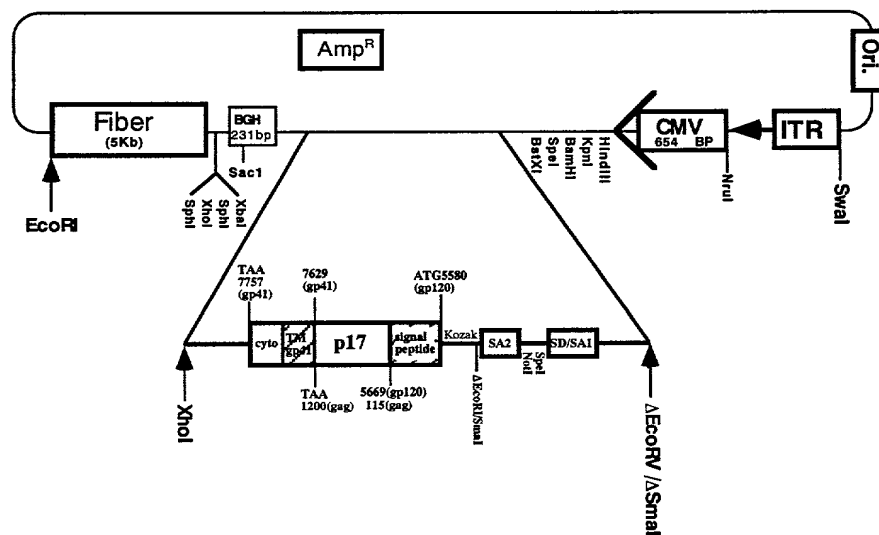
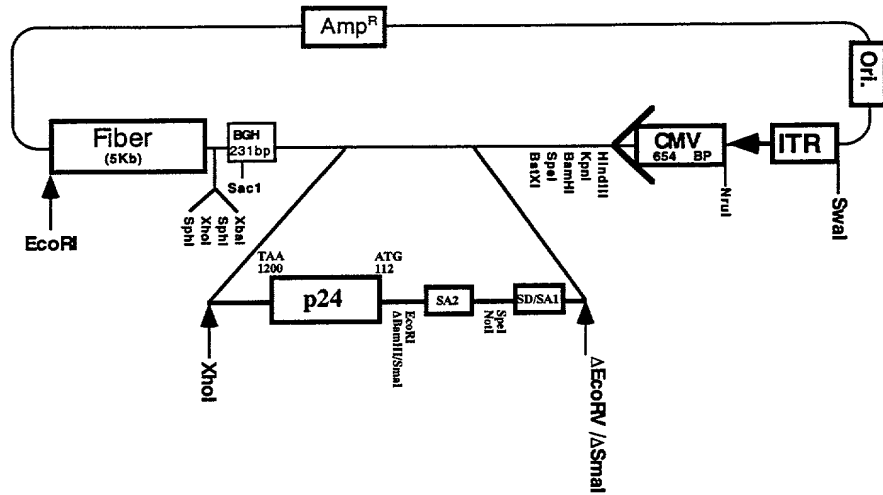
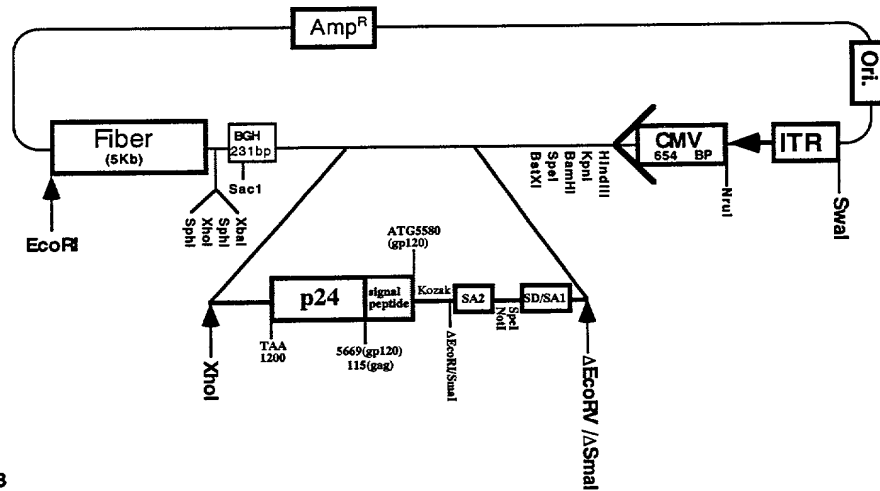


FIGURE 29

A. pRad.ORF6-p24



B. pRad.ORF6-p24sec



C. pRad.ORF6-p24 MB

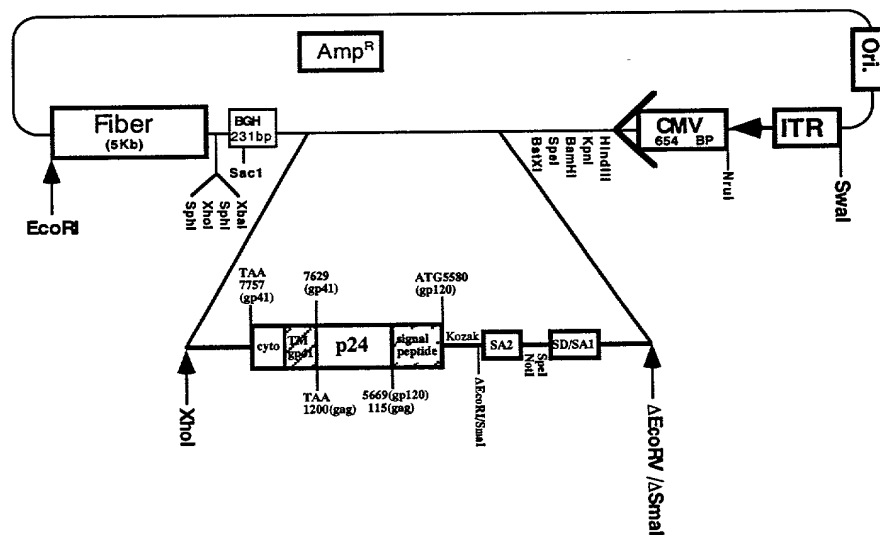


FIGURE 30 Adenoviral construct of Ad-E^m.V3^m/p17/24MB

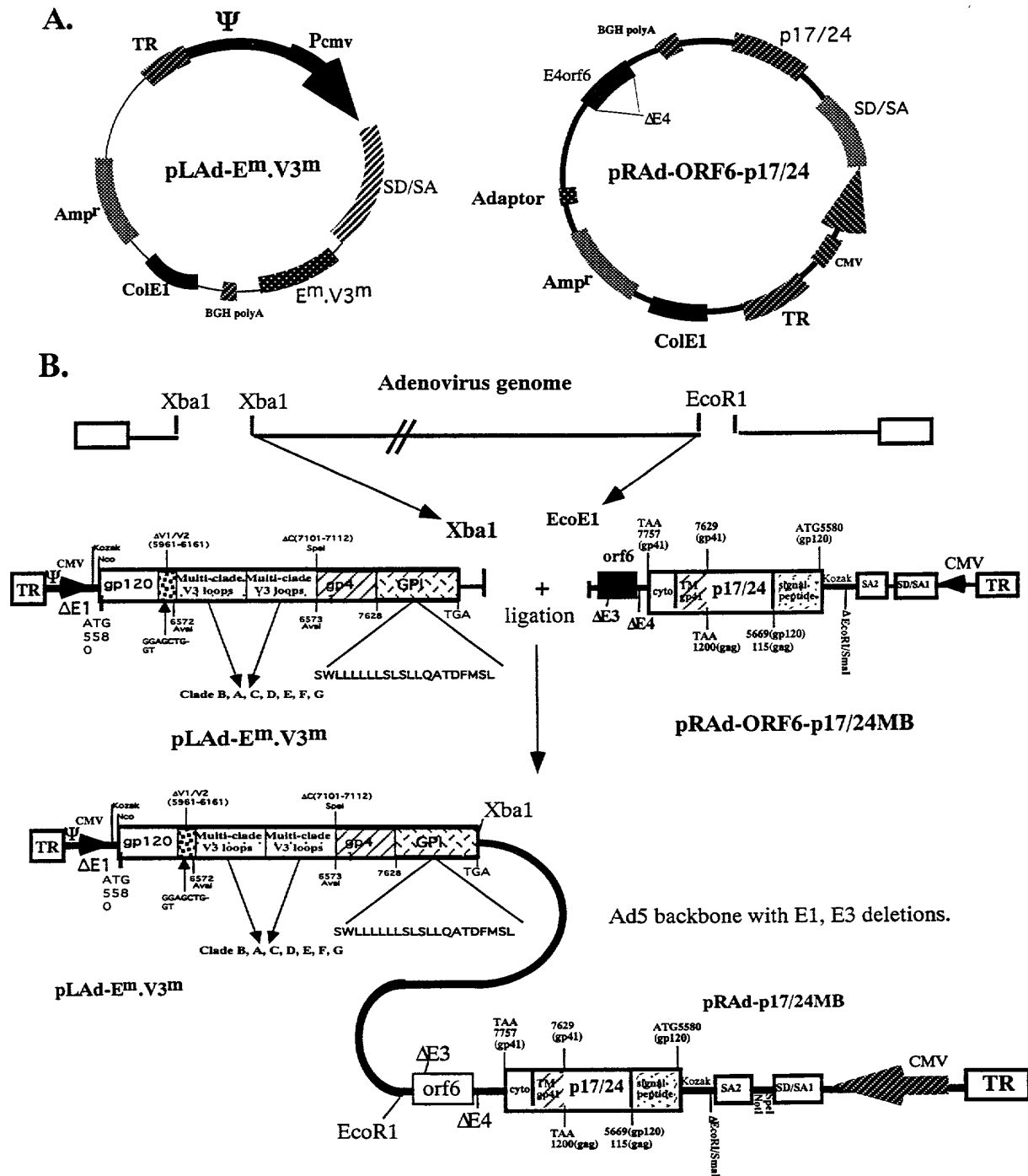


FIGURE 31 Adenoviral construct of Ad-Em.V3m/p17MB

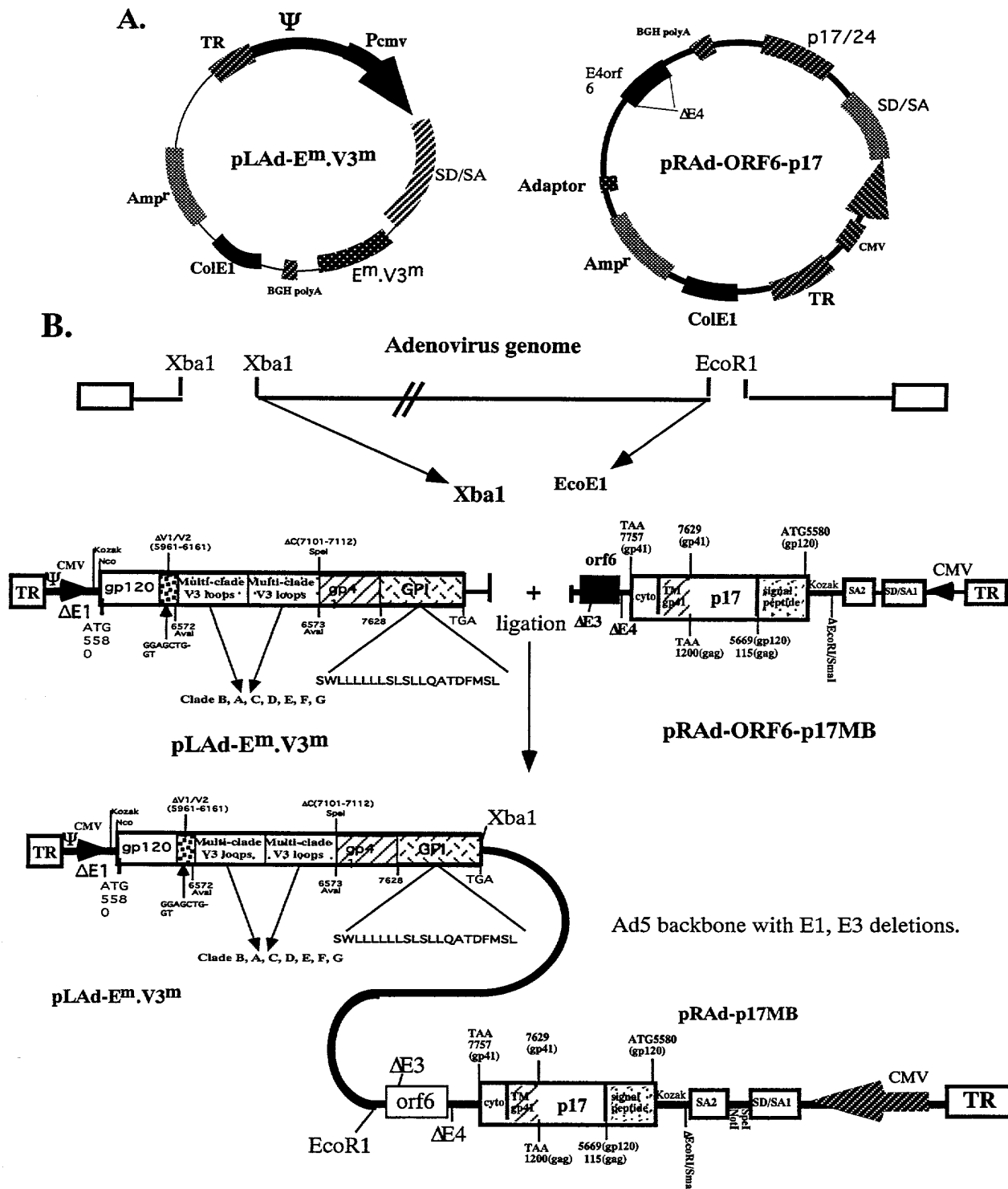
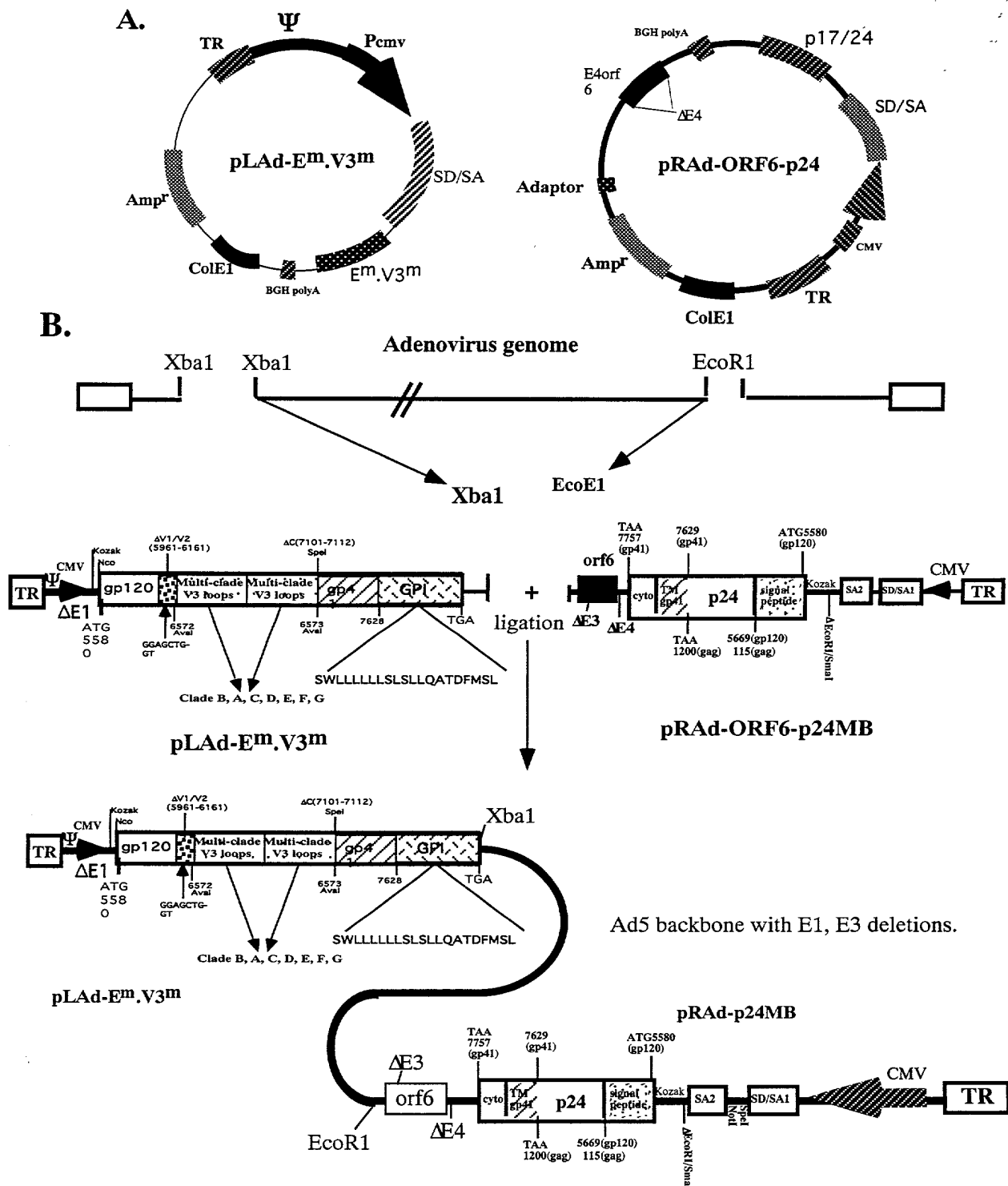


FIGURE 32 Adenoviral construct of Ad-E^m.V3^m/p24MB



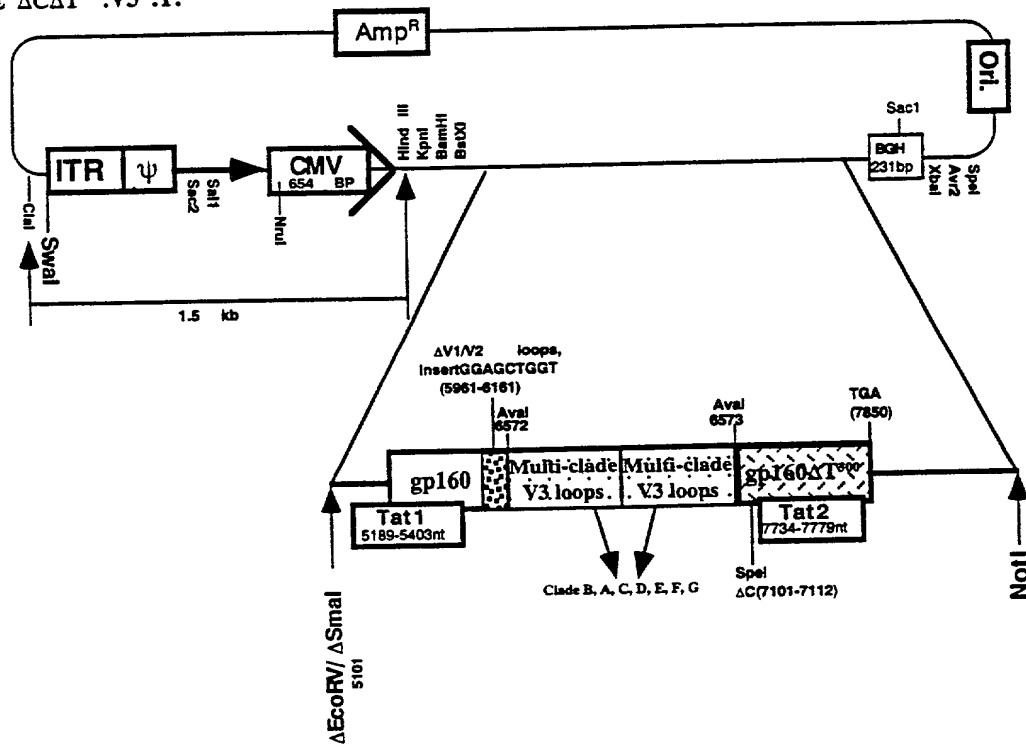
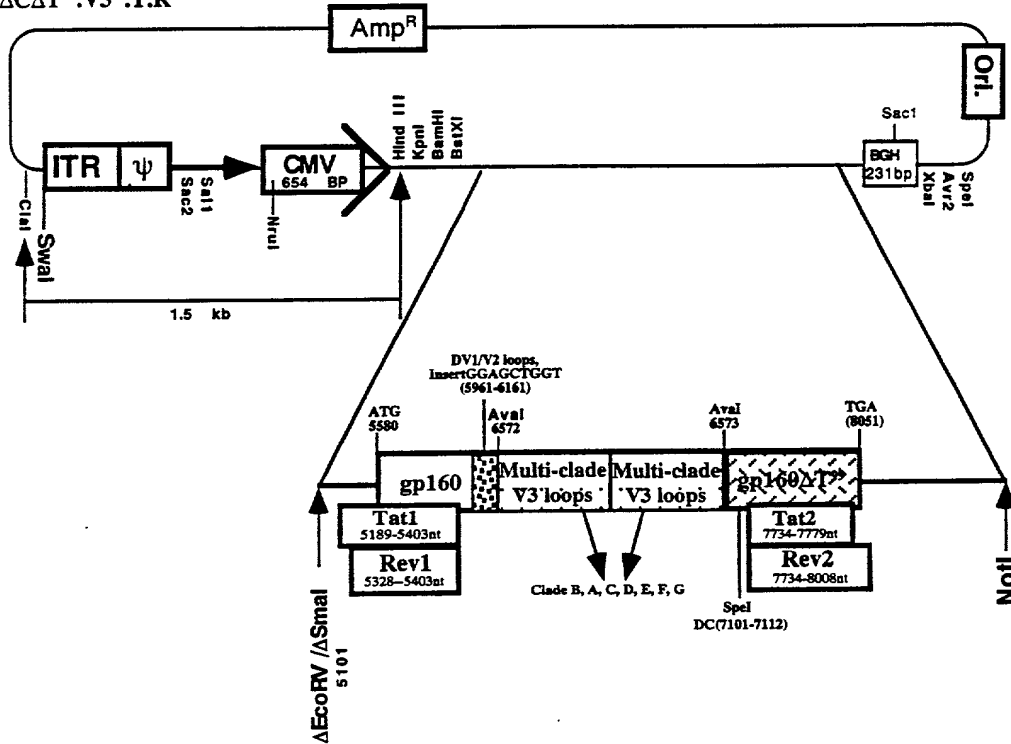
[illegible]

FIGURE 34

pLAd-E^ΔCA^{T99}.V3^Δ.T.R



pRAAd.ORF6-G.PI

FIGURE 35

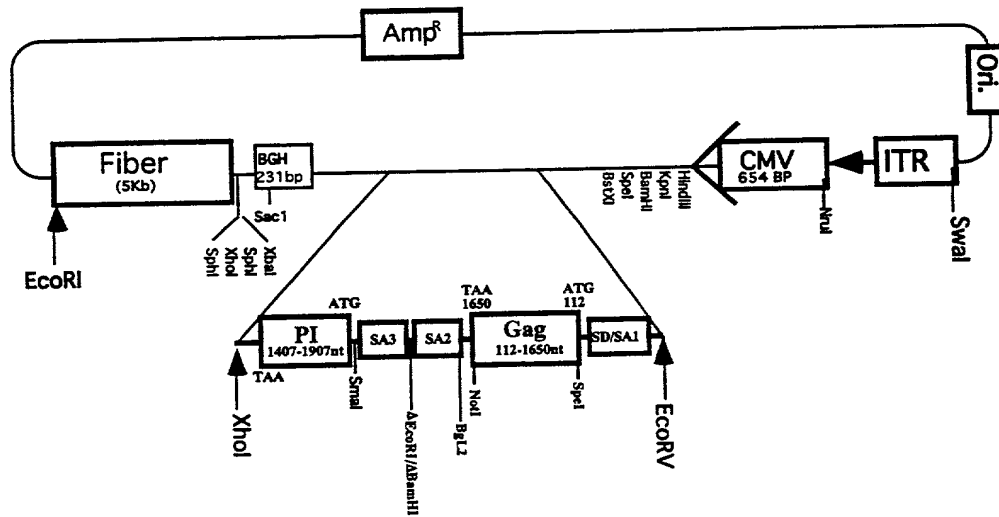


FIGURE 36

pRad. ORF6-G-PI

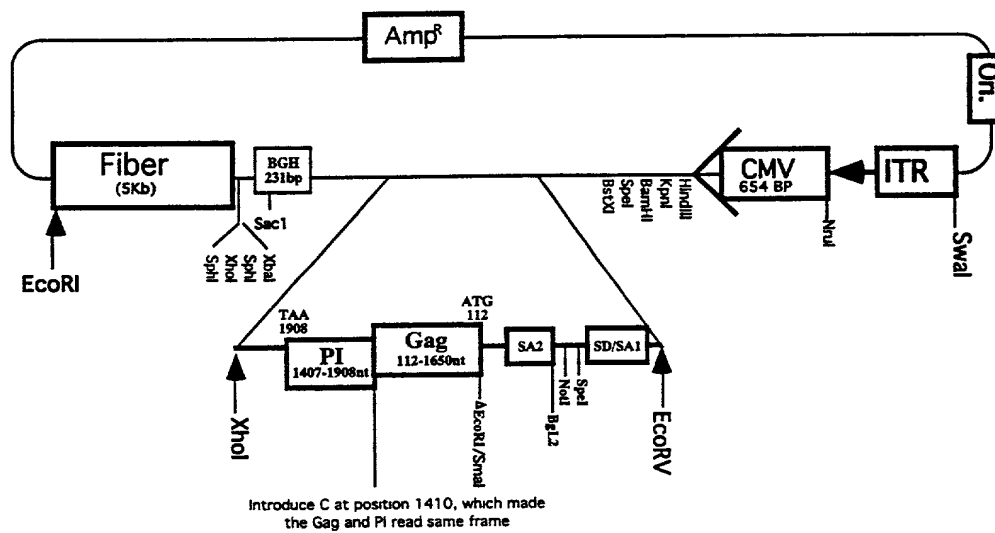


FIGURE 37

SD/SA1.2.3 vector

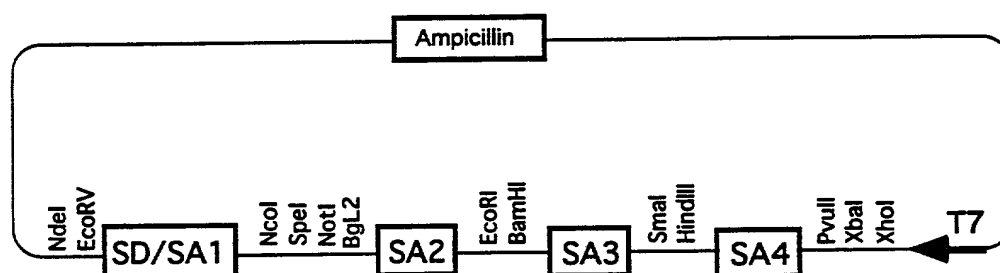


FIGURE 38

DNA Sequence of Env/Tat/Rev from BH10 clone [SEQ ID NO: 14]:

Gaatttctgcaacaactgctgtttatccattttcagaattgggtgtcgacat

EcoRI

agcagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctgga
agcatccaggaagtcagcctaaaactgctgtaccaattgctattgtaaaaagtggtgctttcattgccaa
gtttgtttcatacaaaaagccttaggcatctcctatggcaggaagaagcggagacagcgacgaagacctcc
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tagcaatagtagcatttagtagtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatat
aggaaaatattaagacaaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtg
caatgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatggggcaccatgctccttggg
atgttgatgatctgtagtgtcacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaagg
agcaaccaccactctattttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggcca
cacatgcctgtgtacccacagaccccaaccacaagaagtagtattggtaaatgtgacagaaaaatttaac
atgtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcctaaagcc
atgtgtaaaaatcaaccactctgtgttagtttaaagtgcactgatttgaagaatgataactaataccaata
gtagtacgggagaatgataatggagaaaggagagataaaaaactgctctttcaatatcagcacaagcata
agaggttaaggtgcagaaagaatatgcattttttataaaacttgatataataccaatagataatgatactac
cagctatacgttgacaagttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaa
ttcccatacattattgtgcccgggctggttttgcgattctaaaatgtaataataagacggtcaatggaaca
ggaccatgtacaaatgtcagcacagtagaatgtacacatggaattaggccagtagtatcaactcaactgct
gttaaatggcagtcctggcagaagaagagtagtaattagatctgccaatttcacagacaatgctaaaacca
taatagtagcagctgaaccaatctgtagaaatattgtacaagaccacaacaatacaagaaaaagtagtc
cgtatccagagaggaccaggagagcatttgttacaataggaaaaataggaaatatgagacaagcacattg
taacatttagtagagcaaaatggaataacactttaaaacagatagatagcaaatgaagaacaatttgga
ataataaaacaataatctttaagcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgt
ggaggggaatttttctactgttaattcaacacaactgtttaatagtacttgggttaatagtacttggagta
ctaaaggtcaaataacactgaaggaagtgcacacatcaccctcccatgcagaataaaaacaaattataaac
atgtggcaggaagtaggaaaagcaatgtatgccctcccatcagtggaacaaattagatgttcatcaaatat
tacagggtctgtattaacaagagatggtggttaatagcaacaatgagtcagagatcttcagacctggaggag
gagatatgagggaacattggagaagtgaattatataaaatataaagttagtaaaaattgaaccattaggagta
gcaccaccaaggcaagagaagagtggtgcagagagaaaaaagagcagtggaataggagctttgttcct
tgggttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagacaat
tattgtctggtatagtgcagcagcagaacaatttgcaggggtattgagggcgaacagcatctgttgcaa
ctcacagtcctggggcatcaagcagctccaggcaagaatcctggctgtggaagatacctaaaggatcaaca
gctcctggggatttggggttgcctctggaaaactcatttgcaccactgctgtgccttgggaatgctagtgg
gtaataaatctctggaacagatttggaaataacatgacctggatggagtgggacagagaaattaacaattac
acaagcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattgga
attagataaatgggcaagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattca
taatgatagtaggaggttggtaggtttaagaatagtttttgcgtgactttctgtagtgaatagagttagg
cagggatattcaccattatcgtttcagacccacctcccaatcccagggggacccgacaggccgaaggaat
agaagaagaaggtggagagagagacagagacagatccattcgattagtgaaacggatccttagcattatct
gggacgatctgcccagcctgtgcctcttcagctaccaccgcttgagagacttactcttgattgtaacgagg
attgtggaactctgggacgcagggggtgggaagccctcaaataattggtggaatctcctacagttatggag
tcaggagctaaagaatagtgctgttagcttgcctcaatgccacagctatagcagtagctgaggggacagata
gggttatagaagtagtacaaggagcttatagagctattcgccacatacctagaagaataagacagggcttg
gaaaggattttgctataagatgggtggcaagtggcaaaaagtagtggttggtggatggcctgctgtaaggg
aaagaatgagacgagctgagccagcagcagatgggggtgggagcagcatctcgag

XhoI

FIGURE 39

DNA Sequence of IL-2ΔX [SEQ ID NO: 15]:

Tcactctctttaatcactactcacagtaacctcaactcctgccacaatgta
caggatgcaactcctgtcttgcatcactaagtcttgcaactgtcacaaa
cagtgcacctacttcaagttctacaaagaaaacacagctacaactggagca
tttactgctggatttacagatgattttgaatggaattaataattacaagaa
tcccaaactcaccaggatgctcacatttaagttttacatgccaagaaggc
cacagaactgaaacatcttcagtgctcttgaagaagaactcaaactctgga

ΔXbaI (cta → ctt)

ggaagtgctaaatttagctcaaagcaaaaactttcacttaagaccagggga
cttaatcagcaatatcaacgtaatagttctggaactaaagggatctgaaac
aacattcatgtgtgaatatgctgatgagacagcaaccattgtagaatttct
gaacagatggattaccttttgtcaaagcatcatctcaacactaacttga

FIGURE 40

DNA Sequence of Env^mΔCΔT³⁰⁰ (HIV strain BH10) [SEQ ID NO: 16]:

Gaattcgccaccatgggagtggaaggagaaatatcagcacttgtggagatg

EcoRI Kozak NcoI

ggggtggagatggggcaccatgctccttgggatgttgatgatctgtagtgtctacagaaaaa
ttgtgggtcacagtctattatgggtacctgtgtggaagggaagcaaccaccactctat
gtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccacacatgcctg
tgtaccacagaccccaaccacagaagtagtattggtaaagtgtgacagaaaattttaac
atgtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaa
gcctaaagccatgtgtaaaattaacccactctgtgttagtttaaagtgcactgatttgaa
gaatgataactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaa
aactgctctttcaatatcagcacaagcataagaggtgaaggtgcagaaagaatatgcatttt
tttataaacttgatataataccaatagataatgatactaccagctatacgttgacaagttg
taacacctcagtcattacacaggcctgtccaaagggtatcctttgagccaattcccatat
tattgtgccccggctgtgttttgcgattctaaaatgtaataataagacgttcaatggaacag
gacctgtacaaatgtcagcacagtagcaatgtacacatggaattaggccagtagtatcaac
tcaactgctgttaaattggcagtcctggcagaagaagaggtagtaattagatctgccaatttc
acagacaatgctaaaaccataatagtagcagctgaaccaatctgtagaaattaattgtacaa
gacccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgt
tacaataggaaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaatgg
aataacacttttaaacagatagatagcaaatgaagaacaatttggaataataaaacaa
taatctttaagcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgtgg
aggggaatttttctactgtaattcaacacaactgtttaatagtacttggtttaatagtact
tggagtactaaagggtcaaataaactgaagggaagtgcacaaatcacctcccatgcagaa
taaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgcccctcccatcag
tggacaaattagatgttcatcaaataattacagggtgctattaacaagagatggtggtaat
agcaacaatgagtcagagatcttcagacctggaggaggagatatgagggacaattggagaa
gtgaattatataaatataaagtagtaaaaattgaaccattaggagtagcaccaccaaggc
aaagagaagagtggtgcagACTAGTgcagtggaataggagctt

ΔCleavage site (**agagaaaaaga**) → SpeI

tgttccttgggttcttggggagcagcaggaagcactatgggctgcagcgtcaatgacgctgac
ggtacaggccagacaattattgtctggtatagtgacgcagcagacaattttgctgagggct
attgaggcgcaacagcatctgttgcaactcacagtctggggcatcaagcagctccaggcaa
gaatcctggctgtggaaagatacctaaaggatcaacagctcctggggatttggggttgctc
tggaaaactcatttgcaccactgctgtgccttgggaatgctagtggagtaataaatctctg
gaacagatttgaataacatgacctggatggagtgggacagagaaattaacaattacacaa
gcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaatt
attggaattagataaatgggcaagtttggtgaattgggttaacataacaaattggctgtg
tatataaaattattcataatgatagtaggaggttggttaggtttaagaatagtttttgctg
tactttctgtagtgaatagagtttaggcaggatattcaccattatcgtttcagacccacct
cccaatcccagggggacccgacaggcccgaaggaatagaagaagaaggtggagagagagac
agagacagatccattcgattagtgaaacggatccttagcacttatctggtaa

FIGURE 41A

DNA Sequence of Full length HIV-1 Gag [SEQ ID NO: 17]:

ggctagaaggagagaggatgggtgcgagagcgtcagtattaagcgggggag
aattagatcgatgggaaaaaattcgggttaaggccagggggaaagaaaaaat
ataaattaaaacatatagtatgggcaagcaggagctagaacgactacaac
catcccttcagacaggatcagaagaacttagatcattatataatacagtag
caaccctctattgtgtgcatcaaaggatagagataaaagacaccaaggaag
ctttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagc
aagcagcagctgacacaggacacagcagtcaggtcagccaaaattacccta
tagtgcagaacatccaggggcaaattggtacatcaggccatatcacctagaa
ctttaaatgcatgggtaaaagtagtagaagagaaggctttcagcccagaag
taatacccatgttttcagcattatcagaaggagccaccccacaagatttaa
acaccatgctaaacacagtggggggacatcaagcagccatgcaaatgttaa
aagagaccatcaatgaggaagctgcagaatgggatagagtacatccagtgc
atgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgaca
tagcaggaactactagtacccttcaggaacaaataggatggatgacaaata
atccacctatcccagtaggagaaattttataaaaagatggataatcctgggat
taaataaaaatagtaagaatgtatagccctaccagcatttctggacataagac
aaggaccaaagaaccttttagagactatgtagaccggttctataaaactc
taagagccgagcaagcttcacaggaggtaaaaaattggatgacagaaacct
tgttgggtccaaaatgcgaaccagattgttaagactattttaaaagcattgg
gaccagcggctacactagaagaaatgatgacagcatgtcagggagtaggag
gacccggccataaggcaagagttttggctgaagcaatgagccaagtaacaa
atacagctaccataatgatgcagagaggcaatttttaggaaccaaagaaaga
tggttaagtgtttcaattgtggcaaagaagggcacacagccagaaattgca
gggcccctaggaaaaagggtgttggaatgtggaaaggaaggacaccaa
tgaaagattgtactgagagacaggctaatttttttagggaagatctggcctt
cctacaagggaaggccagggaattttcttcagagcagaccagagccaacag
ccccaccattttcttcagagcagaccagagccaacagccccaccagaagaga
gcttcaggctctggggtagagacaacaactccccctcagaagcaggagccga
tagacaaggaactgtatcctttaacttcctcagatcactctttggcaacg
accctcgtcacaataa

Year	Percentage (%)
1990	65
1992	75
1994	70
1996	78
1998	85
2000	90

Ref.	Year	Country	Sample Size	Age Range	Gender	Study Type	Findings
1	1998	USA	1,000	18-25	Male	Survey	High levels of stress and anxiety
2	2001	UK	2,500	16-30	Female	Survey	Increased levels of depression
3	2003	Canada	1,500	19-35	Male	Survey	High levels of stress and anxiety
4	2005	Australia	3,000	17-30	Female	Survey	Increased levels of depression
5	2007	USA	1,200	18-25	Male	Survey	High levels of stress and anxiety
6	2009	UK	2,800	16-30	Female	Survey	Increased levels of depression
7	2011	Canada	1,600	19-35	Male	Survey	High levels of stress and anxiety
8	2013	Australia	3,200	17-30	Female	Survey	Increased levels of depression
9	2015	USA	1,300	18-25	Male	Survey	High levels of stress and anxiety
10	2017	UK	2,900	16-30	Female	Survey	Increased levels of depression
11	2019	Canada	1,700	19-35	Male	Survey	High levels of stress and anxiety
12	2021	Australia	3,400	17-30	Female	Survey	Increased levels of depression

Ref.	Year	Country	Sample Size	Study Design	Findings
1	1995	USA	1,000	Survey	High prevalence of mental health issues
2	1996	USA	2,000	Survey	Increased awareness of mental health
3	1997	USA	1,500	Survey	Need for mental health services
4	1998	USA	1,200	Survey	Barriers to mental health care
5	1999	USA	1,800	Survey	Impact of mental health on quality of life
6	2000	USA	1,600	Survey	Role of family in mental health
7	2001	USA	1,400	Survey	Effectiveness of mental health interventions
8	2002	USA	1,300	Survey	Challenges in mental health research
9	2003	USA	1,700	Survey	Importance of mental health in public health
10	2004	USA	1,900	Survey	Future directions in mental health

FIGURE 42

DNA Sequence of E^mΔCΔT⁹⁹.T.R (HIV strain pNL4-3) [SEQ ID NO: 19]:

Gaattctgcaacaactgctgtttatccatttcagaattgggtgtcgacatag

EcoRI

cagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctggaagca
tccaggaagtcagcctaaaactgcttgtaaccaattgctattgtaaaaagtgttgctttcattgccaagtttgt
ttcatgacaaaagccttaggcatctcctatggcaggaagaagcggagacagcgacgaagagctcatcagaaca
gtcagactcatcaagcttctctatcaaagcagtaagtagtacatgtaatgcaacctataatagtagcaatagt
agcattagtagtagcaataataatagcaatagttgtgtgtggtccatagtaatcatagaatataggaaaatatta
agacaaagaaaaatagacaggttaattgatagactaataagaaagagcagaagacagtggaatgagagtgaag
gagaagtatcagcacttgtggagatgggggtggaaatggggcaccatgctccttgggatattgatgatctgta
gtgctacagaaaaatgtgggtcacagcttattatgggtacctgtgtggaaggaagcaaccaccactctatt
ttgtgcatcagatgctaagcatatgtacagaggtacataatgtttgggccacacatgctgtgtaccaca
gaccccaaccacagaagtagtattggtaaatgtgacagaaaaattttaacatgtggaaaaatgacatggtag
aacagatgcatgaggatataatcagtttatgggatcaaagcctaagccatgtgtaaaatttaacccactctg
tgtagtttaaaagtgcactgatttgaagaatgataactaataccaatagtagtagcgaggagaatgataatggag
aaaggagagataaaaaactgctctttcaatatcagcacaaagcataagagataaggtgcagaaaagaatatgcat
tcttttataaaacttgatatagtagtaaccaatagataataacca
gctatagggttgataagttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaattcc
catacattattgtgccccggctggttttgcgattctaaaatgtaataataagacggttcaatggaacaggacca
tgtacaaatgtcagcacagtagtaaatgtacacatggaatcaggccagtagtatcaactcaactgctgttaaag
gcagcttagcagaagaagatgtagtaattagatctgccaatttcacagacaatgctaaaaccataatagtaca
gctgaacacatctgtagaaattaattgtacaagacccaacaacaatacaagaaaaagtatccgtatccagagg
ggaccaggagagcatttgttacaataggaaaaaataggaatatgagacaaagcattgttaacattagtagag
caaaatggaatgccactttaaaacagatagctagcaaatgaagagaacaatttggaaataataaaacaataat
ctttaagcaatcctcaggaggggaccagaaaattgtaacgcacagttttaattgtggaggggaaattttctac
tgtaattcaacacaaactgtttaatagtagtacttggtttaatagtagtacttgagtagtgaaggtcaaataacactg
aagggaagtgcacaatccactcccatgcagaataaaacaatttataaacatgtggcaggaagtaggaaaagc
aatgtatgccctcccatcagtggaacaaatagatgttcatcaaataattactgggctgctattaacaagagat
gggtgtaataacaacaatgggtccgagatcttcagacctggaggaggcgatatgagggacaattggagaagtg
aattatataaatataaagtagtaaaaattgaaccattaggtagtagcaccaccaaggcaagagaagagtggt
gcagACTAGTgcagtggaataggagccttgttccttg

ΔCleavage site (agagaaaaaaga) → SpeI

ggttcttgggagcagcaggaagcactatgggctgcacgtcaatgacgctgacggtacaggccagacaattatt
gtctgatatagtgagcagcagaacaatttgcaggggctattgaggcgcaacagcatctgttgcaactcaca
gtctggggcatcaaacagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctgg
ggatttggggttgcctctggaactcatttgcaccactgctgtgccttgggaatgctagttggagtaataaac
tctggaacagatttgggaataacatgacctggatggagtggaagagagaaatttaacaattacacaagcttaata
cactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagataaatggg
caagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattcataatgatagtaggagg
cttggttaggtttaagaatagtttttgcgtgactttctatagtgaaatagagtttaggcagggatattcaccatta
tcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaggaatagaagaagaaggtggagaga
gagacagagacagatccattcgattagtgaaacggatccttagcacttatctgggacgatctgcggagcctgtg
cctcttcagctaccacgcttgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcagg
gggtgggaagccctcaaatattggtggaatctcctacagtattggagtcaggaaactaaagaatagtgctgtta
acttgctcaatgccacagccatagcagtagctgagtaa

FIGURE 43

DNA Sequence of E^mΔV₁₂ΔCAT⁹⁹.T.R (Strain pNL4-3) [SEQ ID NO: 20]:

Gaattctgcaacaactgctgtttatccatttcagaattgggtgtcgacatag

EcoRI

Cagaataggcggttactcgacagaggagagcaagaatggagccagtagatcctagactagagccctggaagca
tccaggaagttagcctaaaactgctgtaccaattgctattgtaaaaagtgttgctttcattgccaagttgt
ttcatgacaaaagccttaggcattctcctatggcaggaagaagcggagacagcgacgaagagctcatcagaaca
gtcagactcatcaagcttctctatcaaagcagtaagtagtacctgtaatgcaacctataatagtagcaatagt
agcattagtagtagcaataataatagcaatagttgtgtgggtccatagtaatcatagaatataggaaaatatta
agacaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtggaatgagagtggaag
gagaagtatcagcacttgtggagatgggggtggaaatggggcaccatgctccttgggatattgatgatctgta
gtgctacagaaaaattgtgggtcagagctattatgggggtacctgtgtggaaggaagcaaccaccactctatt
ttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccacacatgctgtgtaccacaca
gaccccaaccacagaagaagtagtattggtaaatgtgacagaaaaattttaacatgtggaaaaatgacatggtag
aacagatgcatgaggatataatcagtttatgggatcaaagcctaaagccatgtgtaaaaattaaccccactctg
tggt ΔV1 and V2 loops

Agttgtaacacctcagtcattacacaggcctgtccaaagggtatcctttgagccaattcccatacattattgtg
ccccggctggttttgcgattctaaaaatgtaataataagacggttcaatggaacaggaccatgtacaaatgtcag
cacagtacaatgtacacatggaatcaggccagtagtatcaactcaactgctgttaaatggcagctctagcagaa
gaagatgtagtaattagatctgccaatctcacagacaatgctaaaaccataatagtagcagctgaacacatctg
tagaaattaattgtacaagacccaacaacaatacaagaaaaagtatccgtatccagaggggaccaggggagagc
atttgttacaataggaataataggaatatgagacaagcacattgtaacattagtagagcaaaatggaatgcc
actttaaacagatagctagcaaaattaagagaacaatttggaaataataaaacaataatctttaagcaatcct
caggaggggaccacagaaattgtaacgcacagttttaattgtggaggggaatttttctactgttaattcaacaca
actgtttaatagtacttggtttaatagtacttggagtactgaaggggtcaaataaactgaaggaagtgcacaca
atcacactcccatgcagaataaaaacaatttataaacatgtggcaggaagtaggaaaagcaatgtatgccctc
ccatcagtggaacaaattagatgttcatcaaatattactgggctgctattaacaagagatgggtggaataaaca
caatgggtccgagatcttcagacctggaggaggcgatagagggacaattggagaagtgaattatataaatat
aaagtagtaaaaattgaaccattaggagtagcaccaccaaaggcaagagaagagtggtgcagACTAGTgcag
tggaataggagcctttgttccttgggttcttgggagca

ΔCleavage site (agagaaaaaaga) → SpeI

gcaggaagcactatgggctgcagctcaatgacgctgacggtacaggccagacaattattgtctgatatagtg
agcagcagaacaatttgcagggctattgaggcgcaacagcatctgttgcaactcacagctctggggcatcaa
acagctccagggaagaatcctggctgtggaagatacctaaaggatcaacagctcctggggatttgggggtgc
tctggaaaactcatttgcaccactgctgtgccttggaaatgctagttggagtaataaatctctggaacagattt
ggaataacatgacctggatggagtgaggacagagaaattaacaattacacaagcttaatacactccttaattga
agaatcgcaaaaccagcaagaaaaagaatgaacaagaattattggaattagataaatgggcaagtttgggaat
tggtttaacataacaaattggctgtggtatataaaattattcataatgatagtaggaggcttggtaggttta
gaatagtttttgcgtgactttctatagtgaatagagttaggcagggatattcaccattatcgtttcagacca
cctcccaatcccaggggacccgacaggcccgaaggaatagaagaagaaggtggagagagagacagagacaga
tccattcgattagtgaaaggatccttagcacttatctgggacgatctgcggagcctgtgcctcttcagctacc
accgcttgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcaggggggtgggaagccct
caaatattgggtggaatctcctacagattggagtcaggaactaaagaatagtgctgttaacttgctcaatgcc
acagccatagcagtagctgagtaa

FIGURE 44

DNA Sequence of Env^mΔC.T.R.N (Strain BH10) [SEQ ID NO: 21]:

Gaattctgcaacaactgctgtttatccatcttcagaattgggtgtcgacat

EcoRI

agcagaataggcggttactcgacagaggagagcaagaatggagccagtagatcctagactagagccctgga
agcatccaggaagtgcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgccttcattgccaa
gtttgtttcataacaaaagccttaggcattctcctatggcaggaagaagcggagacagcgacgaagacctcc
tcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagtacatgtaatgcaacctatatacaa
tagcaatagtagcattagtagtagcaataataatagcaatagttgtgtgggtccatagtaatcatagaatat
aggaaaatattaagacaaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtg
caatgagagtgaggagaaaatatcagcacttgtggagatgggggtggagatggggcaccatgctccttggg
atgttgatgatctgtagtgtacagaaaaattgtgggtcacagtcctattatgggggtacctgtgtggaagga
agcaaccaccactctattttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggcca
cacatgcctgtgtaccacagaccaccaaccacagaagtagtattggtaaatgtgacagaaaaattttaac
atgtgaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcctaaagcc
atgtgtaaaaataaacccactctgtgttagtttaaaagtgcactgatttgaagaatgatactaatccaata
gtagtacggggagaatgataatggagaaaggagagataaaaaactgctctttcaatatcagcacaagcata
agaggttaaggtgcagaaagaatatgcattttttataaaacttgatataataccaatagataatgatactac
cagctatacgttgacaagttgtaacacctcagtcattacacaggcctgtccaaaggatcctttgagccaa
ttcccatacattattgtgccccggctgggttttgcgattctaaaatgtaataataagacgttcaatggaaca
ggaccatgtacaaatgtcagcacagtagcaatgtacacatggaattaggccagtagtatcaactcaactgct
gttaaatggcagtcctggcagaagaaggtagtaattagatctgccaatttcacagacaatgctaaaacca
taatagtagcagctgaaaccaatctgtagaaattaatgtacaagacccaacaacaatacaagaaaaagtatc
cgtatccagagaggaccaggggagagcatttgttacaataggaaaaataggaaatagagacaagcacattg
taacattagtagagcaaatggaataacactttaaaacagatagatagcaaatgaaagaaacatttgga
ataataaaacaataatctttaagcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgt
ggaggggaatttttctactgttaattcaacacaaactgtttaaatagtacttggttaatagtacttgagtag
taaaagggtcaaataacactgaagggaagtgcacacatcacctcccatgcagaataaaacaaattataaaca
tgtggcaggaagtaggaaaagcaatgtatgcccctcccatcagtggaacaaatagatgttcatcaaatatt
acagggtcgtatatacaagagatggtggtaatgacaacaaatgagtcagagatcttcagacctggaggagg
agatatgagggacaattggagaagtgaattatataaatataaagtagtaaaaattgaaccattaggagtag
caccaccaaggcaaaagagaagagtggtgcagACTAGTgcagtggaataggagccttggctccttgggttc
t

ΔCleaveage site (agagaaaaaaga)→SpeI

tgggagcagcaggaagcactatgggagcagcgtcaatgacgctgacggtagcagccagacaattattgtct
ggtatagtcagcagcagaacaatttgcctgagggctattgaggcgcaacagcatctgttgcaactcacagt
ctggggcatcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctgg
ggatttgggggttgccttggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaa
tctctgggaacagatttgggaataacatgacctggatggagtgaggacagagaaattaaacaattacacaagctt
aatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagata
aatgggcaagtttgtggaattggtttaaatacaacaaattggctgtggtatataaaattattcataatgata
gtaggaggttggtaggtttaaagaatagtttttgcctgtactttctgtagtgaatagagttaggcagggata
ttcaccattatcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaaggaatagaagaag
aagggtggagagagagacagagacagatccattcgattagtgaaacggatccttagcacttatctgggacgat
ctgaggagcctgtgcctcttcagctaccacggcttgagagacttactcttgattgtaacgaggattgtgga
acttctgggagcaggggggtgggaagccctcaaattattggtggaatctcctacagtagttggagtcaggagc
taaagaatagtgctgttagcttgcctcaatgccacagctatagcagtagctgaggggacagatagggttata
gaagtagtacaaggagcttatagagctattcgccacatacctagaagaataagacagggccttggaaggat
tttgctataagatgggtggcaagtggtcaaaaagtagtggtggttgatggcctgctgtaagggaagaatg
agacgagctgagccagcagcagatgggggtgggagcagcatctcgagacctagaaaaacatggagcaatcac
aagtagcaacacagcagctaacaatgctgattgtgcctggctagaagcacaagaggaggagggtgggtt
ttcagtcacacctcaggtacctttaagaccaatgacttacaaggcagctgtagatcttagccacttttta
aaagaaaagggggactggaagggttaattcactcccaacgaagacaagatatccttgatctgtggatcta
ccacacacaaggctacttccctgattag

FIGURE 45

DNA Sequence of E^mΔC.N (Strain BH10) [SEQ ID NO: 22]:

Gaattcgccaccatgggagtggaaggagaaatatcagcacttgtggagatgg

EcoRI Kozak NcoI

gggtggagatggggcaccatgctccttgggatgttgatgatctgtagtgtacagaaaaattgtgggtcac
agtctattatggggtaacctgtgtggaaggaaagcaaccaccactctattttgtgcatcagatgctaagcat
atgatacagaggtacataatgtttgggccacacatgctgtgtacccacagaccccaaccacaagaagta
gtatttgtaaatgtgacagaaaaattttaacatgtggaaaaatgacatggtagaacagatgcatgaggat
aatcagtttatgggatcaaagcctaaagccatgtgtaaaaattaacccactctgtgttagtttaaagtga
ctgatttgaagaatgataactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaa
aactgctctttcaatatcagcacaaagcataagaggttaagggtgcagaaagaatatgcattttttataaact
tgatataataaccaatagataatgatactaccagctatacgttgacaagttgtaacacctcagtcattacac
aggcctgtccaaaggtatcctttgagccaattcccatcacattattgtgccccggctggttttgcgattcta
aaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtacaatgtacacatgg
aattaggccagtagtatcaactcaactgctgttaaatggcagctctggcagaagaagaggtagtaattagat
ctgccaatttcacagacaatgctaaaaaccataatagtagcagctgaaccaatctgtagaaattaattgtaca
agaccaacaacaatacaagaaaaagtatccgtatccagagaggaccaggagagcatttgttacaatagg
aaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaatggaataaacactttaaacaga
tagatagcaaatgaagagaacaatttggaataataaaacaataatctttaagcagtcctcaggaggggac
ccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgtaattcaacacaactgtttaa
tagtacttggtttaatagtacttggagtactaaagggtcaaataaacactgaaggaaagtacacaatcacc
tccatgcagaataaaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgccccccatc
agtggacaaattagatgttcatcaaatattacagggtctgtattacaagagatggtggtaatatgcaacaa
tgagtccgagatcttcagacctggaggaggagatatgagggacaattggagaagtgaattatataaatata
aagtagtaaaaattgaaaccattaggagtagcaccaccaaggcaaagagaagagtgtgtgcagACTAGTgca
gtgggaataggagctttgttccttgggttcttggggagc

ΔCleavage site(agagaaaaaga)→SpeI

agcaggaagcactatgggcgagcgtcaatgacgtgacggtagcaggccagacaattattgtctggtatag
tgcagcagcagaacaatttgtctgagggctattgaggcgcaacagcatctgttgcaactcacagtctggggc
atcaagcagctccaggcaagaatcctggctgtggaagatacctaaaggatcaacagctcctggggatttg
gggttgcctctgaaaaactcatttgcaccactgctgtgccttggaatgctagtgtgagtaataaatctctgg
aacagatttggaaataacatgacctggatggagtgggacagagaaaattaacaattacacaagcttaatacac
tccttaattgaagaatcgcaaaaccagcaagaaaaaatgaacaagaattattggaattagataaatgggc
aagtttgtggaattgggttaacataacaaattggctgtggtatataaaattattcataatgatagtaggag
gcttggtaggtttaagaatagtttttgcgtgactttctgtagtgaatagagttaggcagggatattcacca
ttatcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaaggaatagaagaagaaggtgg
agagagagacagagacagatccattcgattagtgaacggatccttagcacttatctgggacgatctgcgga
gcctgtgcctcttcagctaccaccgcttgagagacttactcttgattgtaacgaggattgtggaactctg
ggacgcaggggggtgggaagccctcaaatattgggtggaatctcctacagtattggagtgcaggagctaaagaa
tagtgctgttagcttgcctcaatgccacagctatagcagtagctgaggggacagatagggttatagaagtag
tacaaggagcttatagagctattcgccacatacctagaagaataagacagggcttggaaaggattttgcta
taagatgggtggcaagtgggtcaaaaagtagtgtggttggtggcctgctgtaagggaaagaatgagacgag
ctgagccagcagcagatgggggtgggagcagcatctcgagacctagaaaaacatggagcaatcacaaagtagc
aacacagcagctaacaatgctgattgtgcctggctagaagcacaaagaggaggagggtgggttttccagt
cacacctcaggtacctttaagaccaatgacttacaaggcagctgtagatcttagccactttttaaaagaaa
aggggggactggaagggtcaattcactcccaacgaagacaagatatccttgatctgtggatctaccacaca
caaggctacttccctgattag

FIGURE 46

DNA Sequence of E^mΔCAT³⁰⁰.T (BH10) [SEQ ID NO: 23]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacat

EcoRI

Agcagaataggcgttactcgacagaggagagcaagaaatggagccagtaga

Tat 1

tcttagactagagccctggaagcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaa
agtgttgctttcattgccaagtttgtttcataacaaaagccttaggcatctcctatggcaggaagaagcgg
agacagcgacgaagacctcctcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagtaca
tgtaatgcaacctatacaaatagcaatagtagcattagtagtagcaataataatagcaatagttgtgtggt
ccatagtaatcatagaatataggaataattaagacaaaagaaaaatagacagggttaattgatagactaata
gaaagagcagaagcagtgaggcaatgagagtggaaggaaatatcagcacttgtggagatgggggtggagat
ggggcaccatgctccttgggatgttgatgatctgtagtgtacagaaaaattgtgggtcacagtctattat
gggtacctgtgtggaaggaaagcaaccaccactctatttgtgcatcagatgctaaagcatatgatacaga
ggtacataatgtttgggccacacatgctgtgtacccacagaccccaaccacaagaagtagtattggtaa
atgtgacagaaaaattttaacatgtggaataatgacatggtagaacagatgcatgaggatataatcagttta
tgggatcaaagcctaaagccatgtgtaaaattaacccactctgtgttagtttaaaagtgcactgatttgaa
gaatgatactaataccaatagtagtagcgaggagaatgataatggagaaaggagagataaaaaactgctctt
tcaatatcagcacaagcataagaggtgaaggtgcagaaagaatatgcattttttataaaacttgatataata
ccaatagataatgatactaccagctatacgttgacaagttgtaaacacctcagtcattacacaggcctgtcc
aaaggtatcctttgagccaattcccatacattattgtgccccggctggttttgcgattctaaaatgtaata
ataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtacaatgtacacatggaattaggcca
gtagtatcaactcaactgctgtttaaattggcagctctggcagaagaagaggtagtaattagatctgccattt
cacagacaatgctaaaaccataatagtacagctgaaccaatctgtagaataattgtacaagaccaaca
acaatacaagaaaaagtatccgtatccagagaggaccaggagagcatttgttacaatagaaaaatagga
aatatgagacaagcacattgtaacattagtagagcaaaatggaataacactttaaaacagatagatagcaa
attaagagaacaatttggaataataaaaacaataatctttaagcagtcctcaggaggggaccagaaattg
taacgcacagtttttaattgtggagggaatttttctactgtaattcaacacaactgtttaatagtacttgg
tttaatagtacttggagtactaaagggtcaaataacactgaaggaagtgcacaatcacctcccattgcag
aataaaaaaaattataaacaatgtggcaggaagttaggaaaagcaatgtatgcccctcccatcagtggaacaa
ttagatgttcatcaaatattacagggtgctattaacaagagatggtggttaatagcaacaatgagtcagag
atcttcagacctggaggaggagatagagggacaattggagaagtgaattatataaatataaagttagtaaa
aattgaaccattaggagtagcaccaccaaggcaagagaagagtggtgcagACTAGTgcagtggaatag
gagctttgttccttgggttc

ΔCleavage site (agagaaaaaaga) →SpeI

ttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagacaattattgtc
tggtatagtgcagcagcagaacaatttgcaggggctattgaggcgcaacagcatctgttgcaactcacag
tctggggcatcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctg
gggatttggggttgctctgaaaactcatttgcaccactgctgtgacctggaatgctagttggagtaataa
atctctggaacagatttgaataacatgacctggatggagtgggacagagaaattaacaattacacaagct
taatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagat
aaatgggcaagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattcataatgat
agtaggaggttggtaggtttaagaatagttttgctgtactttctgtagtgaatagagttaggcagggat
attcaccattatcgtttcagacccacctccaatcccaggggaccgcagagcccgaaaggaatagaagaa
gaaggtggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctgggtaa

Figure 47

DNA Sequence of E^m/E^m (BH10) [SEQ ID NO: 24]:

Gaattcgccaccatgggagtgaggagaaatatcagcacttgtggagatgg
EcoRI Kozak NcoI
gggtggagatggggcaccatgctccttgggatgttgatgatctgtagtgtacagaaaaattgtgggtcac
agtctattatgggttacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgctaaagcat
atgatacagaggtacataatgtttgggccacacatgctgtgtacccacagacccaaccacaagaagta
gtattggtaaatgtgacagaaaaattttaacatgtggaaaaatgacatggtagaacagatgcatgaggatat
aatcagtttatgggatcaaagcctaaagccatgtgtaaaattaacccactctgtgttagtttaagtgca
ctgatttgaagaatgataactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaa
aactgctctttcaatatcagcacaagcataagaggtaaggtgcagaaagaatatgcattttttataaaact
tgatataataccaatagataatgatactaccagctatacgttgacaagttgtaaacacctcagtcattacac
aggcctgtccaaaggtatcctttgagccaattcccatacattattgtgccccgctgggttttgcgattcta
aaatgtaataataagacgttcaatggaacaggacatgtacaaatgtcagcacagtacaatgtacacatgg
aattaggccagtagtatcaactcaactgctgttaaatggcagctctggcagaagaagaggtagtaattagat
ctgccaaatttcacagacaatgctaaaaccataatagtagcagctgaaccaatctgtagaattaattgtaca
agacccaacaacaatacaagaaaaagtatccgtatccagagaggaccaggaggagcatttgttacaatagg
aaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaatggaataacactttaaacacaga
tagatagcaaatgaagagaacaatttggaaataataaaacaataatctttaagcagtcctcaggaggggac
ccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgtaattcaacacaactgtttaa
tagtacttgggttaatatgtacttggagtactaaaggggtcaaataacactgaaggagtgacacaaatcccc
tcccatgcagaataaaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgccctcccac
agtggacaaattagatgttcatcaaatattacagggctgctattaacaagagatgggtggaatagcaacaa
tgagtccgagatcttcagacctggaggaggagatatgagggacaattggagaagtgaattatataaatata
aagtagtaaaaattgaaccattaggagtagcaccaccaaggcaaagagaagagtggtgcagagagaaaaa
agagcagtggggaataggagctttgttccttgggttcttgggagcagcaggaagcactatgggcgcagcgtc
aatgacgctgacggtacagggcagacaattattgtctggtatagtgcagcagcagaacaatttgctgaggg
ctattgaggcgcaacagcatctgttgcaactcacagctctggggcatcaagcagctccaggcaagaatcctg
gctgtggaagatacctaaaggatcaacagctcctggggatttgggggtgctctggaaaactcatttgcac
cactgctgtgccttgggaatgctagttggagtaataaatctctggaacagatttggaaataacatgacctgga
tggagtgggacagagaaattaaacattacacaagcttaatacactccttaattgaagaatcgcaaaaccag
caagaaaagaatgaacaagaattattggaattagataaatgggcaagtttgtggaattggtttaacataac
aaattggctgtggtatataaaattattcataatgatagtaggaggttggttaggtttaagaatagtttttg
ctgtactttctgtagtgaatagagtttaggcagggatattcaccattatcgtttcagacccacctccaatc
ccgaggggacccgacagggccgaagggaatagaagaagaaggtggagagagagacagagacagatccattcg
attagtgaacggatccttagcacttatctgggacgatctgcggagcctgtgcctcttcagctaccaccgct
tgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcagggggtgggaagccctcaaa
tattggtggaatctcctacagtattggagtcaggagctaaagaatagtgcgtgttagcttgcctcaatgccac
agctatagcagtagctgaggggacagatagggttatagaagtagtacaaggagcttatagagctattcgcc
acatacctagaagaataagacagggccttgaaaggattttgctataa

FIGURE 48

Sequences of V3 loop Multi-clade HIV-1 Clones:

Clade	ACC#	HIV-1 Strain	From(nt)	To(nt)
B	M15654	BH10	885	992
A	U09127	192UG037WHO.01083hED	888	992
C	U09126	192BR025WHO.01093hED	876	980
D	U43386	192UG024.2	888	989
E	U08458	193TH976.17	894	998
F	U27401	193BR020.17	888	992
G	U30312	192RU131.9	885	989

Tgtacaagacccaacaacaataacaagaaaaagtatccgtatccagagagga
ccaggagagcatttggttacaataggaaaaataggaaatatgagacaagca
cattgt **Clade B [SEQ ID NO: 25]**

Tgtaccagacctaacaacaataacaagaaaaagtgtacgtataggaccagga
caaacattctatgcaacagggtgatataataggggatataagacaagcacat
tgt **Clade A [SEQ ID NO: 26]**

Tgtacgagacccaacaataataacaagaaaaagtataaggataggaccagga
caagcattctatgcaacaggagaaataataggagatataagacaagcacat
tgt **Clade C [SEQ ID NO: 27]**

Tgcacaaggccctacaacaataataagacaaaaggacccccataggactaggg
caagcactctataacaagaagaatagaagatataagaagagcacattgt
Clade D [SEQ ID NO: 28]

Tgtaccagaccctccaccaataacaagaacaagtatacgtataggaccagga
caagtattctatagaacaggagacataacaggagatataagaaaagcatat
tgt **Clade E [SEQ ID NO: 29]**

Tgtacaagacccaacaacaataacaagaaaaagaatatcttttaggaccagga
cgagtattttatacagcaggagaaataataggagacatcagaaaggcacat
tgt **Clade F [SEQ ID NO: 30]**

Tgtaccagacctaataacaataacaagaaaaagtataacttttgcaccagga
caagcgctctatgcaacagggtgaaataataggagatataagacaagcacat
tgt **Clade G [SEQ ID NO: 31]**

FIGURE 49A

DNA sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 32]:

Atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatggggcaccatgctccttgggat
gttgatgatctgtagtgtacagaaaaattgtgggtcacagtctattatgggggtacctgtgtggaaggaag
caaccaccactctatTTTTgtgcatcagatgctaagcatatgatacagaggtacataaatgtttgggccaca
catgctgtgtacccacagaccccaaccacaagaagtagtatttggtaaatgtacagaaaaatttaacat
gtggaaaaatgacatggttagaacagatgcatgaggatataatcagtttatgggatcaaagcctaagccat
gtgtaaaattaacccactctgtgtt**ggagctggtagttgtaacacctcagt**

V1, V2 deletion, GAG insertion

Cattacacaggcctgttccaaagggtatcctttgagccaattcccatacattattgtgccccgctggttttg
cgattctaaaaatgtaataataagacgttcaatgggaacaggaccatgtacaaatgtcagcacagtacaatgt
acacatggaattaggccagtagtatcaactcaactgctgttaaatggcagctctggcagaagaagaggttagt
aattagatctgccaaatttcacagacaatgctaaaaccataatgtacagctgaaccaatctgtagaatta
att**gtacaagaccaacaaca**

Start of Clade B

Tacaagaaaaagtatccgtatccagagaggaccaggagagcatttgttacaataggaaaaataggaaata
tgagacaagcacattgt**ctcgggtgtaccag**

Insert a *Ava*I site Clade A

Acctaacaacaataacaagaaaaagtgatgtaggaccaggacaaacattctatgcaacagggtgatataa
taggggatataagacaagcacattgt**gtac**

Clade C

Gagacccaacaataataacaagaaaaagtataaggataggaccaggacaagcattctatgcaacaggagaaa
taataggagatataagacaagcacattgt**tg**

Clade D

Cacaaggccctacaacaataataagacaaaggacccccataggactagggcaagcactctataacaagaa
gaatagaagatataagaagagcacattgt**tg**

Clade E

Taccagacctccaccaataacaagaacaagtatacgtataggaccaggacaagtattctatagaacaggag
acataacaggagatataagaaaagcatattgt**ggatcctgt**tacaagaccaacaacaataacaagaaaaaga
atatctttagg

BamHI clade F

AccaggacgagtatTTTTatacagcaggagaaataataggagacatcagaaaggcacattgt**gtaccagac**
ctaataacaataacaagaaaaagtataacttt

Clade G

Tgcaccaggacaagcgctctatgcaacagggtgaataataggagatataagacaagcacattgt**ctcggga**
acattagtagagcaaaatggaataacacttt

Insert a *Ava*I

Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatctttaagcagtcctcag
gaggggaccagaaattgtaacgcacagttttaattgtggagggaatttttctactgtaattcaacacaa
ctgtttaatagtacttggtttaatagtacttggagtactaaagggtcaaataacactgaaggaagtgcac
aatcacccctcccatgcagaataaaaacaattataaacatgtggcaggaagtaggaaaagcaatgtatgcc
ctcccatcagtggaacaaattagatgttcataaatattacagggtgctattaacaagagatgggtggtaat
agcaacaatgagtcagagatcttcagacctggaggaggagatagagggacaattggagaagtgaattata
taaataaaagttagtaaaaattgaaccattaggagtagcaccaccaaggcaagagaagagtggtgcaga
ctagtgcagtggg

Cleavage site mutation (*Spe*I)

Aataggagctttgttccttgggttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctga
cggtagaggccagacaattattgtctggtatagtgcagcagcagaacaatttgcctgagggtcattgagcg
caacagcatctgttgcaactcacagtctggggcatcaagcagctccaggcaagaatcctggctgtggaag
atacctaaaggatcaacagctcctggggatttgggggtgctctggaactcatttgcaccactgctgtgc
cttgggaatgctagtgtgagtaataaatctctggaacagatttggaaataacatgacctggatggagtggaac
agagaaattaacaattacacaagcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaaagaa
tgaacaagaattattggaattagataaatgggcaagtttgggaattggtttaacataacaattggctgt
ggtatataaaat**ctgtggctgctgctgctcctcctcctcctcaggccacggatttcattgtcc**
ctgtga

GPI anchor

FIGURE 49B

Amino acid sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 33]:

M R V K E K Y Q H L W R W G W R W G
T M L L G M L I C S A T E K L S A T
A V Y Y G V P V P W T E V H A T V W L
A S D A K A V A P N D K E V N V N V
E C V P T D W Q S N N P Q E V H V V
I N F L N M D Q K S L D T P V V L V
V G A W S C P I T C N T P V C Q M H
S F L N G S I P H N G Y C A Q A L V
K C E N P K T G R V T A G T L W V
V Q S C L T A I E V R K S I R S V
G S K N T N I T G N D I R I R S V
A P N V T I N G N D I R I R S V
P F R Y P A N T N G N D I R I R S V
T F R Y P A N T N G N D I R I R S V
T T N D N G N E T I R I R S V
G N A N G N E T I R I R S V
A N G A G V L T M R N R P L T N G Q V M S E W A
G V L T M R N R P L T N G Q V M S E W A
V L T M R N R P L T N G Q V M S E W A
L T M R N R P L T N G Q V M S E W A
T M R N R P L T N G Q V M S E W A
R N R P L T N G Q V M S E W A
P L T N G Q V M S E W A
L T N G Q V M S E W A
Q V M S E W A
M S E W A
S E W A
E W A
W A
T

FIGURE 50A

1. DNA sequence of p17/24 in natural form [SEQ ID NO: 34]:

atgggtgagagagcgtcagtattaaagcgggggagaattagatcgatgggaaaaaattcggttaaggccagg
gggaaagaaaaataaaattaaaacatatagtagggcaagcaggagctagaacgattcgagttaatc
ctggcctgttagaaaacatcagaaggctgtagacaaatactgggacagctacaaccatcccttcagacagga
tcagaagaacttagatcattatataatacagtagcaaccctctattgtgtgcatcaaaggatagagataaa
agacaccaaggaagcctttagacaagatagaggaagagcaaaacaaaagtaagaaaaagcacagcaagcag
cagctgacacaggacacagcagtcaggtcagccaaaattaccctatagtgagaacatccaggggcaaatg
gtacatcaggccatcacctagaactttaaatgcatgggtaaaagtagtagaagagaaggctttcagccc
agaagtaatacccatgttttcagcattatcagaaggagccacccacaagatttaaacaccatgctaaaca
cagtggtggggacatcaagcagccatgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggat
agagtacatccagtgcagtcaggccctattgcaccaggccagatgagagaaccaaggggaagtgcatagc
aggaactactagtacccttcaggaacaaaataggatggatgacaaataatccacctatcccagtaggagaaa
ttataaaaagatggataatcctgggattaaaataaaaatagtaagaatgtatagccctaccagcattctggac
ataagacaaggacaaaagaaccttttagagactatgtagaccggttctataaaactctaagagccgagca
agcttcacaggaggtaaaaaattggatgacagaaaccttgttggtccaaaatgcgaaccagattgtaaga
ctattttaaaagcattgggaccagcggctacactagaagaaatgatgacagcatgtcaggagtaggagga
cccgccataaggcaagagttttgtaa

2. DNA sequence of p17/24 in secreted form [SEQ ID NO: 35]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg

gp120 signal peptide

ggcaccatgctccttgggatgttgatgatctgtagtgcctggtgcgagagcg

p17/p24

tcagtattaaagcgggggagaattagatcgatgggaaaaaattcggttaaggccagggggaaagaaaaata
taaattaaaacatatagtagggcaagcaggagctagaacgattcgagttaatcctggcctgttagaaa
catcagaaggctgttagacaaatactgggacagctacaaccatcccttcagacaggatcagaagaacttaga
tcattatataatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagc
tttagacaagatagaggaagagcaaaacaaaagtaagaaaaagcacagcaagcagcagctgacacaggac
acagcagtcaggtcagccaaaattaccctatagtgagaacatccaggggcaaatggtacatcaggccata
tcacctagaactttaaatgcatgggtaaaagtagtagaagagaaggctttcagcccagaagtaatacccat
gttttcagcattatcagaaggagccacccacaagatttaaacaccatgctaaacacagtggtggggacatc
aagcagccatgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggatagagtacatccagt
catgcaggccctattgcaccaggccagatgagagaaccaaggggaagtgcatagcaggaactactagtac
ccttcaggaacaaaataggatggatgacaaataatccacctatcccagtaggagaaatttataaaagatgga
taatcctgggattaaaataaaaatagtaagaatgtatagccctaccagcattctggacataagacaaggacca
aaagaaccttttagagactatgtagaccggttctataaaactctaagagccgagcaagcttcacaggaggt
aaaaaattggatgacagaaaccttgttggtccaaaatgcgaaccagattgtaagactattttaaaagcat
tgggaccagcggctacactagaagaaatgatgacagcatgtcaggagtaggaggacccggccataaggca
agagttttgtaa

FIGURE 50B

1. Amino acid sequence of p17/24 in natural form [SEQ ID NO: 37]:

M	G	A	R	A	S	V	L	S	G	G	E	L	D	R	W	E	K
I	R	L	R	P	G	G	K	K	K	Y	K	L	K	H	I	V	W
A	S	R	E	L	E	R	F	A	V	N	P	G	L	L	E	T	S
E	G	C	R	Q	I	L	G	Q	L	Q	P	S	L	Q	T	G	S
E	E	L	R	S	L	Y	N	T	V	A	T	L	Y	C	V	H	Q
R	I	E	I	K	D	T	K	E	A	L	D	K	I	E	E	S	Q
N	K	S	K	K	K	A	Q	Q	A	A	D	T	G	H	S	V	S
Q	V	S	Q	N	Y	P	I	V	Q	N	I	Q	G	Q	M	E	H
Q	A	I	S	P	R	T	L	N	A	W	V	K	V	V	E	E	K
A	F	S	P	E	V	I	P	M	F	S	A	L	S	E	G	A	T
P	Q	D	L	N	T	M	L	N	T	V	A	G	H	Q	A	A	M
Q	M	H	K	E	T	I	N	E	A	A	E	R	E	P	R	G	S
D	I	A	G	T	T	S	T	L	Q	E	Q	I	G	W	M	T	N
N	P	P	I	P	V	G	E	I	Y	K	R	W	I	I	L	G	L
N	K	I	V	R	M	Y	S	P	T	S	I	L	D	I	R	Q	G
P	K	E	P	F	R	D	Y	V	D	R	F	Y	K	T	L	V	A
E	Q	A	S	Q	E	V	K	N	W	M	T	E	T	L	L	A	Q
N	A	N	P	D	C	K	T	I	L	K	A	L	G	P	A	A	T
L	E	E	M	M	T	A	C	Q	G	V	G	G	P	G	H	K	A
R	V	L	*														

2. Amino acid sequence of p17/24 in secreted form [SEQ ID NO: 38]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	G	A	R	A	S	V
L	S	G	G	E	L	D	R	W	E	K	I	R	L	R	P	G	R
K	K	K	Y	K	L	K	H	I	V	W	A	S	R	E	L	E	R
F	A	V	N	P	G	L	L	E	T	S	E	G	C	R	Q	I	L
G	Q	L	Q	P	S	L	Q	E	T	G	S	E	E	R	S	L	Y
N	T	V	A	T	L	Y	C	V	H	Q	R	I	E	I	K	D	T
K	E	A	L	D	K	I	E	E	E	Q	N	K	S	K	K	K	A
Q	Q	A	A	A	D	T	G	H	S	S	Q	V	S	Q	N	Y	P
Q	Q	A	A	A	D	T	G	H	S	S	Q	V	S	Q	N	Y	P
I	V	Q	N	I	Q	G	Q	M	V	H	Q	A	I	S	P	R	T
L	N	A	W	V	K	V	V	E	E	K	A	F	S	P	E	V	I
P	M	F	S	A	L	S	E	G	A	T	P	Q	D	L	N	T	M
L	N	E	V	G	E	H	Q	A	V	H	P	V	H	K	E	T	I
A	P	G	Q	M	R	E	P	R	G	S	D	I	A	G	T	P	S
T	L	Q	E	Q	I	G	W	M	T	N	N	P	P	I	P	V	G
E	I	Y	K	R	I	I	I	L	G	L	N	K	I	V	R	F	Y
S	V	D	S	I	F	Y	K	T	L	R	A	E	Q	A	P	R	D
T	I	L	K	A	L	G	P	A	A	T	L	E	E	M	M	E	V
C	Q	G	V	G	G	P	G	H	K	A	R	V	L	*			A

[illegible]

1. Amino acid sequence of p17/24 in membrane bound form [SEQ ID NO: 39]:

[illegible]

FIGURE 51A

1. DNA sequence of p17 in natural form [SEQ ID NO: 40]:

atgggtgcgagagcgtcagttattaagcgggggagaattagatcgatgggaaaaaattcg
gttaaggccagggggaaagaaaaaatataaattaaaacatatagtatgggcaagcaggg
agctagaacgattcgcagttaatcctggcctgttagaaacatcagaaggctgtagacaa
atactgggacagctacaacatcccttcagacaggatcagaagaacttagatcattata
taatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaagg
aagctttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagca
gcagctgacacaggacacagcagtcaggtcagccaaaattactaa

2. DNA sequence of p17 in secreted form [SEQ ID NO: 41]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
ggcaccatgctccttgggatgttgatgatctgtagtgcggtgagagcg
p17
tcagtattaagcgggggagaattagatcgatgggaaaaaattcgggttaaggccagggg
aaagaaaaaatataaattaaaacatatagtatgggcaagcaggagctagaacgattcg
cagttaatcctggcctgttagaaacatcagaaggctgtagacaaatactgggacagcta
caacatcccttcagacaggatcagaagaacttagatcattatataatacagtagcaac
cctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagctttagacaaga
tagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacagga
cacagcagtcaggtcagccaaaattactaa

3. DNA sequence of p17 in membrane bound form [SEQ ID NO: 42]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
ggcaccatgctccttgggatgttgatgatctgtagtgcggtgagagcg
p17
tcagtattaagcgggggagaattagatcgatgggaaaaaattcgggttaaggccagggg
aaagaaaaaatataaattaaaacatatagtatgggcaagcaggagctagaacgattcg
cagttaatcctggcctgttagaaacatcagaaggctgtagacaaatactgggacagcta
caacatcccttcagacaggatcagaagaacttagatcattatataatacagtagcaac
cctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagctttagacaaga
tagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacagga
cacagcagtcaggtcagccaaaattac
ttattcataatgatagtaggaggttggttaggtttaagaatagtttttgctgtactttc
tgtagtgaatagagttaggcagggatattcaccattatcgtttcagacccacctccaa
tcccaggggataa
gp41 transmembrane domain

[illegible]

Year	Percentage (%)
1950	7.0
1955	7.5
1960	8.0
1965	8.5
1970	9.0
1975	9.5
1980	10.0
1985	10.5
1990	11.0
1995	11.5
2000	12.0
2005	12.5
2010	13.0
2015	13.5
2020	14.0
2025	14.5
2030	15.0
2035	15.5
2040	16.0
2045	16.0
2050	16.0

Year	Percentage (%)
1950	7.0
1955	7.5
1960	8.0
1965	8.5
1970	9.0
1975	9.5
1980	10.0
1985	10.5
1990	11.0
1995	11.5
2000	12.0
2005	12.5
2010	13.0
2015	13.5
2020	14.0
2025	14.5
2030	15.0
2035	15.5
2040	16.0
2045	16.0
2050	16.0

Year	Percentage (%)
1950	7.0
1955	7.5
1960	8.0
1965	8.5
1970	9.0
1975	9.5
1980	10.0
1985	10.5
1990	11.0
1995	11.5
2000	12.0
2005	12.5
2010	13.0
2015	13.5
2020	14.0
2025	14.5
2030	15.0
2035	15.5
2040	16.0
2045	16.0
2050	16.0

Year	Percentage (%)
1950	7.0
1955	7.5
1960	8.0
1965	8.5
1970	9.0
1975	9.5
1980	10.0
1985	10.5
1990	11.0
1995	11.5
2000	12.0
2005	12.5
2010	13.0
2015	13.5
2020	14.0
2025	14.5
2030	15.0
2035	15.5
2040	16.0
2045	16.0
2050	16.0

Year	Percentage (%)
1950	7.0
1955	7.5
1960	8.0
1965	8.5
1970	9.0
1975	9.5
1980	10.0
1985	10.5
1990	11.0
1995	11.5
2000	12.0
2005	12.5
2010	13.0
2015	13.5
2020	14.0
2025	14.5
2030	15.0
2035	15.5
2040	16.0
2045	16.0
2050	16.0

Year	Percentage (%)
1950	7.0
1955	7.5
1960	8.0
1965	8.5
1970	9.0
1975	9.5
1980	10.0
1985	10.5
1990	11.0
1995	11.5
2000	12.0
2005	12.5
2010	13.0
2015	13.5
2020	14.0
2025	14.5
2030	15.0
2035	15.5
2040	16.0
2045	16.0
2050	16.0

FIGURE 52B

1. Amino acid sequence of p24 in natural form [SEQ ID NO: 49]:

M	P	I	V	Q	N	I	Q	G	Q	M	V	H	Q	A	I	S	P
R	T	L	N	A	W	V	K	V	V	E	E	K	A	F	S	P	E
V	I	P	M	F	S	A	L	S	E	G	A	T	P	Q	D	L	N
T	M	L	N	T	V	G	G	H	Q	A	M	H	P	M	H	K	E
T	I	N	E	E	A	A	E	W	D	R	V	S	D	I	A	G	T
P	I	A	P	G	Q	M	R	E	P	R	G	S	D	I	A	G	T
T	S	T	L	Q	E	Q	I	G	W	M	T	N	N	P	P	I	P
V	G	E	I	Y	K	R	W	I	I	L	G	L	N	K	I	V	R
M	Y	S	P	T	S	I	L	D	I	R	Q	G	P	K	E	P	F
R	D	Y	V	D	R	I	Y	K	T	L	R	A	E	A	S	S	Q
E	V	K	N	W	M	T	E	T	L	L	V	Q	N	Q	A	N	D
C	K	T	I	L	K	A	L	G	P	A	A	T	L	E	E	M	M
T	A	C	Q	G	V	G	G	P	G	H	K	A	R	V	L	*	

2. Amino acid sequence of p24 in secreted form [SEQ ID NO: 50]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	P	I	V	Q	N	I
Q	G	Q	M	V	H	Q	A	I	S	P	R	T	L	N	A	W	V
K	V	V	E	E	K	A	F	S	P	E	V	I	P	M	F	S	A
L	S	E	G	A	T	P	Q	D	L	N	T	M	L	N	T	V	A
G	H	Q	A	A	M	Q	M	L	K	E	T	I	N	E	E	A	A
E	W	D	R	V	H	P	V	H	A	G	P	I	A	P	G	Q	M
R	E	P	R	G	S	D	I	A	G	T	T	S	T	L	Q	E	Q
I	G	W	M	T	N	N	P	I	P	I	V	G	E	I	Y	K	R
W	I	I	L	G	L	N	K	I	V	R	M	Y	S	P	T	S	I
L	D	I	R	Q	G	P	K	E	P	F	R	D	Y	V	D	R	F
Y	K	T	L	R	A	E	Q	A	S	Q	E	V	K	N	W	M	T
E	T	L	L	V	Q	N	A	N	P	D	C	K	T	I	L	K	A
L	G	P	A	A	T	L	E	E	M	M	T	A	C	Q	G	V	G
G	P	G	H	K	A	R	V	L	*								

3. Amino acid sequence of p24 in secreted form [SEQ ID NO: 51]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	P	I	V	Q	N	I
Q	G	Q	M	V	H	Q	A	I	S	P	R	T	L	N	A	W	V
K	V	V	E	E	K	A	F	S	P	E	V	I	P	M	F	S	A
L	S	E	G	A	T	P	Q	D	L	N	T	M	L	N	T	V	A
G	H	Q	A	A	M	Q	M	L	K	E	T	I	N	E	E	A	A
R	E	P	R	G	S	D	I	A	G	T	T	S	T	L	Q	E	Q
I	G	W	M	T	N	N	P	I	P	I	V	G	E	I	Y	K	R
W	I	I	L	G	L	N	K	I	V	R	M	Y	S	P	T	S	I
L	D	I	R	Q	G	P	K	E	P	F	R	D	Y	V	D	R	F
Y	K	T	L	R	A	E	Q	A	S	Q	E	V	K	N	W	M	T
E	T	L	L	V	Q	N	A	N	P	D	C	K	T	I	L	K	A
L	G	P	A	A	T	L	E	E	M	M	T	A	C	Q	G	V	G
G	P	G	H	K	A	R	V	L	L	S	V	V	I	N	V	G	R
G	Y	S	P	L	S	F	Q	T	H	L	P	I	P	R	G	*	Q

FIGURE 53A

DNA sequence of modified Env including multi-clade V3 loops and Tat
[SEQ ID NO: 52]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacatagcagaataggcgt
tactcgacagaggagagcaagaaatggagccagtagatcctagactagagccc

Tat1

Tggaagcatccaggaagtgcagcctaactgcttgtagcaattgctattgtaaaaagtgttgctt
tcattgccaaagtttgtttcatacaaaaagccttaggcattctcctatggcaggaagaagcggagac
agcgacgaagacctcctcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagta
catgtaatgcaacctatacaaatagcaatagtagcattagtagtagcaataataatagcaatagt
tgtgtggtccatagtaatcatagaatataggaaaatattaagacaaaagaaaaatagacaggttaa
ttgatagactaatagaaagagcagaagacagtggaatgagagtggaaggagaaatatcagcactt
gtggagatgggggtggagatggg

Envelope

Gcaccatgctccttgggatgttgatgatctgtagtgtacagaaaaattgtgggtcacagtctat
tatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgctaaagcata
tgatacagaggtacataatgttttgggccacacatgcctgtgtaccacagaccccaaccacaag
aagtagtatttggtaaatgtgacagaaaattttaacatgttggaataatgacatggtagaacagatg
catgaggatataatcagtttatgggatcaaagcctaaagccatgtgtaaaaattaacccccactctg
tgttggagctggtagttgtaacacctca

Delete V1V2, insert Gly,Ala,Gly

gtcattacacaggcctgtccaaaggtatcctttgagccaattcccatacattattgtgccccggc
tggttttgcgattctaaaatgtaataataagacggtcaatggaacaggaccatgtacaaatgtca
gcacagtacaatgtacacatggaattaggccagtagtatcaactcaactgctgttaaattggcagt
ctggcagaagaagaggtagtaattagatctgcgaatttcacagacaatgctaaaaccataatagt
acagctgaaccaatctgtagaaattaattgtacaag

First multi-clade repeat

Acccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgtttacaa
taggaaaaataggaaatatgagacaagcacattgtctcggtgtaccagacctaacaacaataca
agaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataataggggatat
aagacaagcacattgttgtacgagacccaacaataatacaagaaaaagtataaggataggaccag
gacaagcattctatgcaacaggagaaataataggagatataagacaagcacattgttgacacaagg
ccctacaacaataataagacaaaggacccccataggactagggcaagcactctatacaacaagaag
aatagaagatataagaagagcacattgttgtaccagaccctccaccaatacaagaacaagtatac
gtataggaccaggacaagttattctatagaacaggagacataacaggagatataagaaaagcatat
tgtggatcctgtacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacgagt
attttatacagcaggagaaataataggagacatcagaaaggcacattgttgtaccagacctaata
acaatacaagaaaaagtataacttttgcaccaggacaagcgctctatgcaacaggtgaaataata
ggagatataagacaagcacattgtctcgggtgtaccagacctaacaacaata

Second multi-clade repeat

Caagaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataataggggat
ataagacaagcacattgttgtacgagacccaacaataatacaagaaaagtataaggataggacc
aggacaagcattctatgcaacaggagaaataataggagatataagacaagcacattgttgacaa
ggccctacaacaataataagacaaaggacccccataggactagggcaagcactctatacaacaaga
agaatagaagatataagaagagcacattgttgtaccagaccctccaccaatacaagaacaagtat
acgtataggaccaggacaagttattctatagaacaggagacataacaggagatataagaaaagcat
attgtggatcctgtacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacga
gtattttatacagcaggagaaataataggagacatcagaaaggcacattgttgtaccagacctaa
taacaatacaagaaaaagtataacttttgcaccaggacaagcgctctatgcaacaggtgaaataa

24240-52300

[illegible]

AvaI site, end of two multi-clade repeat

Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatctttaagcagt
cctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgt
aattcaacacaactgtttaatagtacttggtttaatagtacttggagtactaaagggtcaaataa
cactgaaggaagtgcacaatcacctcccatgcagaataaaacaaattataaacatgtggcagg
aagtaggaaaagcaatgtatgccctcccatcagtggaacaaattagatgttcatcaaatattaca
gggctgctattaacaagagatggtggttaatagcaacaatgagtcaggatcttcagacctggagg
aggagatatgagggacaattggagaagtgaattatataaatataaaagtagtaaaaaattgaaccat
taggagtagcaccaccaaaggcaaagagaagagtgggtgcagactagtgcagtggggaataggagct
ttgttccttgg

AvaI site, end of two multi-clade repeat

Aaaacagatagatagcaaaattaagagaacaatttggaaataataaaacaataatctttaagcagt
cctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgt
aattcaacacaactgtttaatagtacttggtttaatagtacttggagtactaaagggtcaaataa
cactgaaggaagtacacaatcacctcccatgcagaataaaacaaattataaacatgtggcagg
aagtaggaaaagcaatgtatgccctcccatcagtggaacaaattagatgttcatcaaatattaca
gggctgctattaacaagagatggtggttaatagcaacaatgagtcgagatcttcagacctggagg
aggagatatgagggacaattggagaagtgaattatataaaatataaaagtagtaaaaaattgaaccat
taggagtagcacccaccaaggcaaagagaagagtgggtgcagactagtgcagtgggaataggagct
ttgttccttgg

Delete the cleavage site, insert SpeI site

ggtcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagac
aattattgtctggtatagtgacgagcagcagaacaatttgctgagggctattgaggcgcaacagcat
ctgttgcaactcacagtctggggcatcaagcagctccagggaagaatcctggctgtggaaagata
cctaaggatcaacagctcctggggatttggggttgctctggaaaactcatttgcaccactgctg
tgccttggaatgctagtgtggagtaataaatctctggaacagatttggaataacatgacctggatg
gagtgggacagagaaattaacaattacacaagcttaatacactccttaattgaagaatcgcaaaa
ccagcaagaaaagaatgaacaagaattatttggaattagataaaatgggcaagtttggaattggt
ttaacataacaaattggctgtggtgatatataaaattattcataatgatagtaggaggccttggtagg
ttaagaataagtttttctgtgactttctgtagtgaatagagttaggcagggatattcaccattatc
gtttcagacccacctcccaatcccgaggggacccgacaggcccgaagggaatagaagaagaaggtg
gagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctggttaa

gp41, delete the 300 bp at C-terminal

FIGURE 53B

**Amino acid sequence of modified Env including multi-clade V3 loops and Tat
[SEQ ID NO: 53]:**

```

M T A A E I V S K V G A P F T F R Y P T T G N A N G N T N G N R R T T I R I N K S S S E S S L A G V R Q L N M E K K T G L
R M V S C N S G F C Q S K N V R Y P A Y T N D N G N E N G N E I I T G R I K G R I R R I I T R K F G N T A G R K V A Q A R G S R N L M I D
V L Y D V F L A E N C L T N T P A N T N R T I N E T I N D T I R E S D K G S D T R I K S R F Q Q K G S L M L P V V A L Q I C N E Q W I P R
K L Y A P N W G P N T A I N I N T N G N R R T T I R I I Q D D I I R D I I L I C F I K T F Y R G R E A W D Q S I P R *
E G G K T M D S I K H E I T G N G N E I I T G R I K G R I R R I I T R K F G N T A G R K V A Q A R G S R N L M I D
K M V A D W Q C P T G E V R K N D T I R E S D K G S D K G S D T R I K S R F Q Q K G S L M L P V V A L Q I C N E Q W I P R
Y L P Y P K S N I F I E Q K I T I R I Q D D I I R D I I S D I I P R G A L K A A I Q E T P Y L G V Q G L Q L S K I Q N V R D
Q M V D N N L T H N R V L S G R I K G R I R R I I T R V I R R I A P Y G A P H D S F W C A L G K T S S H A G S N E W G G R
H I W T P D K S Y G P V N I N K G S D T R I K S R F Q R R I Q G H G C P H G C S S F S R P T G I S T G L V K L N K F G P S
L C K E Q M P V C T V I Q R M S D I I P R G A L K A A I Q G A L C Q G G C Q L K G Y T I P R D E A M I L E L E Y N N L D I
W S E V E V C I A G V R S I R V I R R I A P Y G A P H G A P H G C V S R C A G L G C K K I D M P V G V Q R I Q T E I V R R
R A A H V E V T P P S S V Q Q R R I Q G H G C P H G C P H G C Q T F C V T L N R D N G Q S G R L G A Q L Y C I S Q T G P L
W T N V Q K Q A C T A E R A I Q G A L C Q G G C Q L G C Q C A R R Y T F R Y I E P S S I G G D G I A Q Q T L T W L E N L E V
G E T V L M L A G T Q N I G H G A P H G C V S R C A G Q C A T L P R R Y P A S Q E T N I Q N N V G S Q V K T N I L W R G N
W K T W V H T C F N L F N P C P H G C Q T F C V T L C T T F R Y S T P T N T R F I Q N N I S W A A M N W D A N H L L I I G
R L L A N E P P A V L T C G L G C C A R R Y T F R Y P T T G N A N G A G V L T M R N R P L T N G Q V M S E W V E S
W W F T V D L K I S L D T R G Q C A T L P R R Y P A R Y P A Y T N D N G N E K N T F E W C N S T F L L I Q P T L Y F E L
G V C H T I C V L T N N R A C T F R Y S T P T N T P A N T N R T I N E T I W N H N G Q S E E K L T L K L W W I D I A E A

```

FIGURE 54A

DNA sequence of modified Env including multi-clade V3 loops, Tat and Rev
[SEQ ID NO: 54]:

gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacatagcagaat
aggcgttactcgacagaggagagcaagaa**atgg**agccagtagatcctagactagagccc

Tat1

tggaagcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtg
ttgctttcattgccaagtttgtttcatacaaaaagccttaggcatctcct**atgg**cagga

Rev1

agaagcggagacagcgacgaagacctcctcaaggcagtcagactcatcaagtttctcta
tcaaagcagtaagtagtacatgtaatgcaacctatacaaatagcaatagtagcattagt
agtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatataggaaaa
tattaagacaaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagac
agtggca**atg**agagtggaaggagaaatatcagcacttgtggagatgggggtggagatggg

Envelope

Gcaccatgctccttgggatgttgatgatctgtagtgtctacagaaaaattgtgggtcaca
gtctattatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcaga
tgctaaagcatatgatacagaggtacataatgtttgggccacacatgcctgtgtaccca
cagaccccaaccacaagaagtagtatttggtaaatgtgacagaaaattttaacatgtgg
aaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcct
aaagccatgtgtataaaattaacccactctgtgtt**ggagctgg**tagttgtaacacctca

Delete V1V2, insert Gly,ala,gly

gtcattacacaggcctgtccaaaggatatcctttgagccaattcccatacattattgtgc
cccggtgtgttttgcgattctaaaatgtaataataagacgttcaatggaacaggacat
gtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaactcaa
ctgctgttaaattggcagctctggcagaagaagaggtagtaattagatctgccaatctcac
agacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaat**tgt**tacaa
g

First multi-clades repeat

Acccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttg
ttacaataggaaaaataggaaatatgagacaagcacattgtctcggtgtaccagacct
aacaacaatacaagaaaaagtgtagctataggaccaggacaaacattctatgcaacagg
tgatataataggggatataagacaagcacattgttgtacgagacccaacaataatacaa
gaaaaagtataaggataggaccaggacaagcattctatgcaacaggagaaataatagga
gatataagacaagcacattgttgcacaaggccctacaacaataataagacaaaggacccc
cataggactagggcaagcactctatacaacaagaagaatagaagatataagaagagcac
attgttgtaccagaccctccaccaatacaagaacaagtatacgtataggaccaggacaa
gtattctatagaacaggagacataacaggagatataagaaaagcatattgtggatcctg
tacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacgagtatttt
atacagcaggagaaataataggagacatcagaaaggcacattgttgtaccagacctaat
aacaatacaagaaaaagataacttttgcaccaggacaagcgctctatgcaacagggtga
aataataggagatataagacaagcacattgtctcggt**gt**taccagacctacaacaata

Second multi-clade repeat

caagaaaaagtgtagctataggaccaggacaaacattctatgcaacagggtgatataata
ggggatataagacaagcacattgttgtacgagacccaacaataatacaagaaaaagtat

FIGURE 54A-continued

aaggataggaccaggacaagcattctatgcaacaggagaaaataataggagatataagac
aagcacattgttgcacaaggccctacaacaatataagacaaaaggacccccataggacta
gggcaagcactctatacaacaagaagaatagaagatataagaagagcacattgttgtag
cagacctccaccaataacaagaacaagtatacgtataggaccaggacaagtattctata
gaacaggagacataacaggagatataagaaaagcatattgtggatcctgtacaagaccc
aacaacaatatacaagaaaaagaatatcttttaggaccaggacgagtattttatacagcagg
agaaataataggagacatcagaaaggcacattgttgtaccagacctaataacaatacaa
gaaaaagtataacttttgcaccaggacaagcgctctatgcaacagggtgaaataatagga
gatataagacaagcacattgtctcgggaacattagtagagcaaaatggaataacacttt

AvaI site, end of two multi-clade repeat

Aaaacagatagatagcaaattaagagaacaattttgaaataataaaaacaataatcttta
agcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaa
tttttctactgtaattcaacacaactgtttaatagtacttggtttaatagtacttgag
tactaaagggtcaaataacactgaaggaagtgcacacatcacctcccatgcagaataa
aacaattataaacatgtggcaggaagttaggaaaagcaatgtatgcccctcccatcagt
ggacaaattagatgttcatcaaataattacagggtgctattaacaagagatggtggtaa
tagcaacaatgagtcagagatcttcagacctggaggaggagatatgagggacaattgga
gaagtgaattatataaaatataaagttagtaaaaattgaaccattaggagtagcacccacc
aaggcaaagagaagagtgggtgcagactagtgcagtggaataggagctttgttccttgg

Delete the cleavage site, insert SpeI

gttcttgggagcagcaggaagcactatgggctgcacgtcaatgacgctgacggtacagg
ccagacaattattgtctgatatagtgacgagcagacaatttgctgagggctattgag
gcgcaacagcatctgttgcaactcacagctctggggcatcaaacagctccaggcaagaat
cctggctgtggaaagatacctaaaggatcaacagctcctggggatttgggggttgcctg
gaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaatctctg
gaacagatttggaaataacatgacctggatggagtgggacagagaaattaacaattacac
aagcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaag
aattattggaattagataaaatgggcaagtttgtggaattggtttaacataacaattgg
ctgtggtatataaaattattcataatgatagtaggaggcttggtaggtttaagaatagt
ttttgctgtactttctatagtgaatagagttaggcagggatattcaccattatcgtttc
agaccacactcccaatcccagggggacccgacaggcccgaaaggaatagaagaagaaggt
ggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctg
ggacgatctgcggagcctgtgcctcttcagctaccaccgcttgagagacttactcttga
ttgtaacgaggattgtggaacttctgggacgcagggggtgggaagccctcaaataattgg
tggaatctcctacagtattggagtcaggaactaaagaatagtgtgttaacttgctcaa
tgccacagccatagcagtagctgagtaa

gp41, but 99 bp truncation at C-terminal

FIGURE 54B

**Amino acid sequence of modified Env including multi-clade V3 loops, Tat and Rev
[SEQ ID NO: 55]:**

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	T	E	K	L	W	V
A	V	Y	Y	G	V	P	V	W	K	E	A	T	T	T	L	F	C
A	S	D	A	K	A	P	D	T	Q	V	H	N	V	V	A	T	H
E	C	V	P	T	D	Y	N	P	E	E	N	V	Q	N	N	V	T
I	S	F	N	S	Q	K	L	D	M	V	V	K	A	H	P	D	I
V	G	A	G	I	C	S	T	S	P	C	E	Q	L	T	A	L	C
S	C	E	N	K	P	N	H	G	V	A	P	A	G	F	P	K	V
K	Q	N	T	H	T	F	R	P	I	G	S	T	N	L	A	I	L
V	S	C	A	E	G	E	V	V	Q	V	V	A	Q	N	V	S	T
G	A	L	I	I	V	Q	L	N	R	S	I	E	N	F	T	L	N
A	P	T	N	T	K	I	S	I	M	R	Q	R	I	N	C	T	R
P	F	V	I	G	N	T	R	D	S	V	R	A	H	C	G	G	A
T	R	P	N	N	D	I	I	I	I	I	I	Q	G	P	C	C	T
F	R	A	N	E	T	R	R	R	D	R	Q	I	A	H	C	A	F
R	Y	N	G	I	I	I	I	I	I	R	Q	G	H	C	Q	T	R
Y	P	T	N	I	R	Q	R	I	P	A	I	L	G	C	A	L	P
P	T	N	R	T	T	E	I	R	R	G	H	C	C	T	R	R	Y
T	G	N	R	T	G	D	I	K	A	Y	C	G	V	F	Y	P	S
G	N	N	E	I	K	D	I	S	R	A	P	G	S	T	R	R	T
A	N	E	I	I	D	I	I	R	K	A	H	Q	C	L	Y	A	P
N	G	T	I	I	K	I	I	I	I	I	C	L	A	T	T	R	T
G	N	I	R	I	S	D	I	Q	A	H	G	C	C	F	P	Y	N
N	E	I	R	Q	T	P	R	G	L	C	C	A	P	R	T	A	N
R	R	E	I	I	R	R	I	A	C	V	F	R	R	Y	T	N	R
T	T	G	I	I	K	A	G	P	Q	S	T	Y	P	A	N	I	N
T	I	K	I	I	R	F	S	Y	G	C	L	Y	A	N	G	E	T
I	R	S	I	T	Q	A	I	H	C	A	N	I	S	R	K	N	I
N	K	T	I	K	Q	Q	Q	S	K	L	D	E	Q	F	V	T	W
K	S	N	F	G	G	E	T	S	G	G	N	S	T	I	L	F	N
S	S	T	N	T	L	P	C	R	I	K	Q	I	N	N	M	W	G
S	E	V	I	K	M	Y	A	P	P	I	S	G	I	N	R	C	S
S	S	E	I	F	A	L	G	T	D	M	R	D	N	I	N	S	E
L	Y	K	R	Y	V	V	G	I	E	P	L	G	V	A	P	T	K
A	K	L	R	V	A	Q	L	S	A	V	G	I	S	A	L	F	L
G	Q	A	I	A	A	Q	Q	H	I	Q	Q	T	V	M	N	L	T
V	R	L	Q	E	I	C	S	A	L	I	L	T	K	D	Q	I	K
Q	L	A	S	W	N	E	K	N	E	Q	I	W	N	A	V	P	L
L	N	A	W	D	Q	I	Q	N	Y	E	T	L	I	H	S	T	W
M	E	E	S	S	N	N	N	F	N	I	G	E	L	L	E	L	I
E	K	W	A	F	I	V	W	G	N	V	Y	N	R	I	V	F	A
K	K	L	L	S	M	R	R	R	L	R	P	S	P	I	S	E	Q
V	L	H	L	I	I	P	D	P	I	D	L	G	N	I	R	E	E
T	G	I	L	D	D	I	L	S	C	V	L	Y	S	H	R	L	A
L	D	L	L	I	W	L	L	R	V	L	I	A	G	Q	A	R	W
E	N	A	V	N	L	L	N	A	T	A	I		V	E	*	K	

[illegible]

DNA sequence of HIV-1 (strain BH10) Protease (PI, nt 1407-1907) [SEQ ID NO: 56]:

atgttcttaggggaagatctggccttctacaaggggaaggccagggaattttcttcagagcagaccagagcca
acagccccaccatttcttcagagcagaccagagccaacagccccaccagaagagagcttcaggtctgggggt
agagacaacaactccccctcagaagcaggagccgatagacaaggaaactgtatcctttaacttcctcagatc
actctttggcaacgacccctctgcacaataaagataggggggcaactaaagggaagctctattagatacagga
gcagatgatacagtattagaagaaatgagtttgccagggaagatggaaacaaaaaatgataggggggaattgg
aggttttatcaaagtaagacagtatgatcagatactcatagaaatctgtggacataaagctataggtacagtatt
agtaggacctacacctgtcaacataaattggaagaaatctgtigactcagattggttgcactttaaatttttaa

FIGURE 55B

Amino acid sequence of HIV-1 (strain BH10) Protease (PI) [SEQ ID NO: 57]:

[illegible]

FIGURE 56A

DNA sequence of HIV-1 (strain BH10) Gag-PI [SEQ ID NO: 58]:

Atgggtgagagagcgtagtattaagcgggggagaattagatcgatgggaaaaaattcg
gttaaggccagggggaaagaaaaaatataaattaaaacatatagtagggcaagcaggg
agctagaacgatttcgcagtttaattcctggcctgttagaacaatcagaaggctgtagacaa
atactgggacagctacaaccatcccttcagacaggatcagaagaacttagatcattata
taatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaagg
aagcttttagacaagatagaggaagagcaaaacaaaagtaagaaaaagcacagcaagca
gcagctgacacaggacacagcagtcaggtcagccaaaattaccctatagtgagaacat
ccaggggcaaatggtacatcaggccatatacctagaacttttaaatgcatgggtaaaag
tagtagaagagaaggcttttcagcccagaagtaatacccatgttttcagcattatcagaa
ggagccaccccaagattttaaacaccatgctaaacacagtggggggacatcaagcagc
catgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggatagagtacatc
cagtgcatgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgcata
gcaggaactactagtacccttcaggaacaaataggatggatgacaaataatccacctat
cccagtaggagaaatttataaaagatggataatcctgggattaaataaaatagtaagaa
tgtatagccctaccagcattctggacataagacaaggaccaaagaaccttttagagac
tatgtagaccggttctataaaactctaagagccgagcaagcttcacaggagggtaaaaaa
ttggatgacagaaaccttggttggtccaaaatgcgaaccagattgtaagactattttaa
aagcattgggaccagcggtacactagaagaaatgatgacagcatgtcaggagtagga
ggaccggccataaggcaagagttttggctgaagcaatgagccaagtaacaaatacagc
taccataatgatgcagagaggcaatttttaggaaccaagaaagatggttaagtgtttca
attgtggcaaagaagggcacacagccagaaattgcaggggcccctaggaaaaagggtgt
tggaatgtggaaaggaaggacaccaaattgaaagattgtactgagagacaggctaattt
ctttagggaagatctggccttcctacaagggaaggccagggaattttcttcagagcaga
ccagagccaacagccccaccattttcttcagagcagaccagagccaacagccccaccaga
agagagcttcagggtctggggtagagacaacaactccccctcagaagcaggagccgatag
acaaggaactgtatcctttaacttccctcagatcactctttggcaacgacccctcgtca
caataaagataggggggcaactaaaggaagctctattagatacaggagcagatgataca
gtattagaagaaatgagtttgccaggaagatggaaacaaaaatgatagggggaattgg
aggttttatcaaagtaagacagtatgatcagatactcatagaaatctgtggacataaag
ctataggtacagtattagtaggacctacacctgtcaacataattggaagaaatctgttg
actcagattgggtgcacttttaatttttaa

FIGURE 57

Primers for multi-clade V3 loops:

Clade A: (1). forward primer A888F5 [SEQ ID NO: 60]:

5'-aaa tca acc gga att gaa ttc cct cgg gtg tac cag acc taa caa caa tac-3'
EcoRI Aval

(2). reverse primer A-CR3 [SEQ ID NO: 61]:

5'-att gtt ggg tct cgt aca aca atg tgc ttg tct tat atc ccc-3'

Clade C: (3). forward primer A-CF5 [SEQ ID NO: 62]:

5'-ggg gat ata aga caa gca cat tgt acg aga ccc aac aat ac-3'

(4). reverse primer C980R3 [SEQ ID NO: 63]:

5'-gtt gta ggg cct tgt gca aca atg tgc ttg tct tat atc -3'

Clade D: (5). forward primer D888F5 [SEQ ID NO: 64]:

5'-gat ata aga caa gca cat tgt tgc aca agg ccc tac aac-3'

(6). reverse primer D-ER3 [SEQ ID NO: 65]:

5'-ggg gga ggg tct ggt aca aca atg tgc tct tct tat -3'

Clade E: (7). forward primer D-EF5 [SEQ ID NO: 66]:

5' -ata aga aga gca cat tgt tgt acc aga ccc tcc acc-3'

(8). reverse primer E998R3 [SEQ ID NO: 67]:

5'-gta ttg ttg ttg ggt ctt gta caa caa tat gct ttt ctt ata tct cc-3'

Clade F: (9). forward primer F888F5 [SEQ ID NO: 68]:

5'-gga gat ata aga aaa gca tat tgt tgt aca aga ccc aac aac aat ac-3'

(10). reverse primer F-GR3 [SEQ ID NO: 69]:

5'-gtt att agg tct ggt aca aca atg tgc ctt tct gat gtc-3'

Clade G: (11). forward primer F-GF5 [SEQ ID NO: 70]:

5'-gac atc aga aag gca cat tgt tgt acc aga cct aat aac-3'

(12). reverse primer G989R3 [SEQ ID NO: 71]:

5'-aat aaa cta gtc tag acc ccc gag tct aga aca atg tgc ttg tct tat atc tcc-3'
Aval XbaI